

## **Can Devaluation help Nepal Improve its Balance of Trade with India?**

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### **Abstract**

In this study, we tried to find a cointegrating vector with Nepal's export to India-to-Nepal's import from India as the dependent variable, Nepal's real GDP, India's real GDP, and NPR-INR real exchange rate – defined as NPR-INR nominal exchange rate multiplied by the ratio of Nepal's consumer price index to India's consumer price index, while the NPR-INR exchange rate has been defined as the number of Nepalese currency (NPR) needed to purchase one unit of Indian currency (INR) over the data ranging from 1988 to 2014. The estimated value of the coefficient associated with the NPR-INR real exchange rate variable turned out to be statistically significant and greater than 1 in absolute value satisfying the Marshall-Lerner condition. The satisfaction of the Marshall-Lerner condition led us to conclude that a depreciation of NPR (i.e. an appreciation of INR) will improve Nepal's trade balance (i.e. lower Nepal's trade deficit) with India.

**Key Words:** Marshall-Lerner condition, export-to-import ratio, exchange rate elasticity of export, exchange rate elasticity of import, exchange rate, unit root, cointegration

**JEL Classification:** F3

### **I. Introduction**

Nepal has long trade relations with India and China. It is more so with India than with China as about two-thirds of its imports comes from India. Since Nepal has a poor industrial base, a least developed agricultural sector, and a weak service sector, they all have contributed to slow economic growth and increasing dependence of the country on foreign imports. A slow export growth caused by a slow economic expansion together with an ever increasing import has worsened Nepal's net export with most of its trading partners and more so with India.

As the table below shows, Nepal has a trade deficit with India in every single year except in 1999. And the trade deficit does not seem to shrink over time, rather has been increasing. As a consequence, most of the remittances that come to the country through foreign employment of Nepalese workers go to pay for the country's trade deficit with India and contributes almost nothing to the formation of capital in the country. In order to curb its trade deficit a country can use several measures, such as, providing export subsidies or low-interest loans to its export-oriented industries, making its exportable sector more efficient, imposing tariffs on imports, and devaluing its currency. While providing export subsidy or low-interest loan to export-oriented industries or devaluing of domestic currency help lower the price of the country's exports, imposing tariffs on imports, on the other hand, makes imports more expensive to domestic consumers. These measures thus lower the imports and promote the exports and thereby lower a country's trade deficit. Recently the Trump administration has announced a 25 percent and a 10 percent tariff on imported steel and aluminum respectively. The purpose of the tariffs is to curb its trade deficit with the top 15 steel exporters to the United States. While even developed countries, such as the United States, are taking measures to curb their trade deficit, a question suddenly comes to anybody's mind if Nepal can lower its trade deficit with India using one of these measures. Nepalese currency (NPR) has been tied to Indian currency (INR) at  $INR\ 1.00 = NPR\ 1.60$  for so long, which many researchers believe is unrealistic and a major factor in contributing to ever-increasing Nepal's trade deficit with India.

Nepal - India Trade (In Millions of U.S. Dollar)				
Year	Export to India	Import from India	Nepal's Trade Surplus (+) or Deficit(-) with India	Percentage Change
1988	32.26	90.17	-57.91	*
1989	3.00	35.57	-32.57	-43.75755
1990	14.79	58.52	-43.73	34.26466
1991	17.45	85.01	-67.56	54.49348
1992	20.83	80.14	-59.31	-12.21137
1993	17.07	82.99	-65.92	11.14483
1994	12.63	92.97	-80.34	21.875
1995	24.96	117.84	-92.88	15.60866
1996	66.70	441.80	-375.10	303.8544
1997	91.60	435.80	-344.20	-8.237803
1998	145.50	439.70	-294.20	-14.52644
1999	161.52	158.40	3.12	-101.0605
2000	307.20	574.20	-267.00	-8657.692
2001	352.60	612.40	-259.80	-2.696629
2002	363.60	573.80	-210.20	-19.09161
2003	339.80	911.70	-571.90	172.0742
2004	417.10	1,067.10	-650.00	13.65623
2005	540.10	1,230.60	-690.50	6.230769
2006	562.98	1,481.51	-918.53	33.0239
2007	592.48	1,916.77	-1,324.29	44.17493
2008	562.91	2,160.76	-1,597.85	20.65711
2009	562.81	2,131.93	-1,569.12	-1.798041
2010	570.59	3,252.66	-2,682.07	70.92829
2011	614.38	3,751.68	-3,137.30	16.97308
2012	601.18	3,935.46	-3,334.28	6.278647
2013	578.09	4,103.81	-3,525.72	5.741569
2014	584.11	4,935.20	-4,351.09	23.40997

The purpose of this study, therefore, is to examine if devaluing of NPR can help curb or lower Nepal's trade deficit with India. The answer is provided by the Marshall-Lerner condition. Since, in this study, we are taking up the case of Nepal, we are trying to see if the Marshall-Lerner condition is satisfied on the trade between Nepal and India. Satisfaction of this condition will lead us to conclude that devaluing NPR will lead to a greater Nepalese export to India and a smaller Nepalese import from India, thereby, lowering Nepal's trade deficit with India.

Several studies have been done on testing the Marshall-Lerner (M-L) condition on trade between two countries or group of countries. Turkay (2014) investigates the M-L condition in Turkey using Johansen cointegration test and error correction model on data from 1980 to 2012 and finds the validity of the M-L condition implying that a devaluation of Turkish currency will help boost its import. Hinaunye (2013) tests the M-L condition on the data from Namibia. His results indicate that import and export respond significantly to a change in the exchange rate and that the M-L condition does hold for Namibia. A study by Wang, et al (2012) that investigates the short-run and the long-run effects of exchange rate change on trade balance between China and its trading partners using the panel cointegration and the panel error correction methodologies on the data over the period 2005-2009 finds a support for the M-L condition and concludes that a real appreciation of RMB has a decreasing long-run effect on China's trade balance in only three of the eighteen trading partners. Kyophilavong, et al (2013), on the other hand use an ARDL approach and test the M-L condition in case of Laos on quarterly data over the period 1993-2010. They get a perverse

result. They find that the impact of real depreciation of the Lao kip on Lao's trade balance is insignificant in the long run and it has an inverse impact on Lao's trade balance in the short run. A similar study by Set and Har (2014) on the trade between Malaysia and its five main trading partners using the Least Square and the Fully Modified Least Square approach fails to show the validity of M-L condition in all five pairs of bilateral trade. Similarly, Dong (2017) tests the M-L condition between the U.S. and other countries of G7 on data over 1985-2016. He tests for and incorporates nonlinearity into the balance of trade equation of Boyd, Caporale, and Smith. His results indicate that price elasticities of exports and imports hardly satisfy the M-L condition implying that higher real exchange rate depreciation may not necessarily improve the U.S. trade balance with all of the other G7 member countries. Hsing (2010), on the other hand, test the M-L condition on trade between eight selected Asian countries. His results show that the M-L condition only holds for India, Korea, Japan, and Pakistan. A similar study by Onafowora (2003) investigates the trade between three ASEAN countries and the U.S. and Japan. Using the VECM and the generalized impulse response functions approach, his study concludes that M-L condition does hold in the long run but with varying degree of J-curve effects in the short run. Similarly, Pandey (2013), tries to empirically verify the M-L condition on trade between India and other countries. His study finds that the sum of absolute elasticities of imports and export does exceed 1 and, therefore, a rise in the real exchange rate (depreciation of Indian rupee) will boost India's export, thereby, satisfying the Marshall-Lerner condition.

To our knowledge, the Marshall-Lerner condition has never been tested on trade between Nepal and India, which this study will undertake. Section 2 presents the model, section 3 identifies data sources, section 4 details the methodology and empirical findings, and section 5 summarizes the study.

## **II. The Model**

Our model is stated as following:

$$XTM_t = \beta_0 + \beta_1 NRGDP_t + \beta_2 IRGDP_t + \beta_3 REX_t + u_t \quad (1)$$

Where, XTM is the ratio of Nepal's export to India-to-Nepal's import from India, NRGDP is Nepal's real GDP, IRGDP is India's real GDP, REX is Nepalese rupee's real exchange rate with Indian rupee defined as Nepalese rupee's nominal exchange rate with Indian rupee multiplied by India's consumer price index and then divided by Nepal's consumer price index, whereas Nepalese rupee's nominal exchange rate with Indian rupee is defined as the number of Nepalese rupees needed to purchase one Indian rupee.

Here,  $\beta_1$  is expected to be negative, because, any increase in Nepal's real GDP will increase Nepal's imports including that from India thereby lowering the value of XTM. On the other hand,  $\beta_2$  is expected to be positive, because, any increase in India's real GDP will increase India's imports including that from Nepal, thereby raising Nepal's export to India and thereby the value of XTM. Similarly,  $\beta_3$  is expected to be positive, because a rise in the real exchange rate of Nepalese rupee will raise the price of Indian export to Nepal and lower the price of Nepalese export to India, thereby raising Nepal's export to India and lowering Nepal's import from India, ultimately raising the value of XTM.

## **III. Data**

We obtained data on Nepal's export to and import from India from International Monetary Fund website (<http://data.imf.org/regular.aspx?key=61726508>), on Nepal's and India's real

GDP and Nepal’s and India’s annual inflation rate (CPI) from World Development Indicators, 2017, and on average annual exchange rate between Nepalese rupee (NPR) and Indian rupee (INR) from OANDA website (<https://www.oanda.com/currency/average>). Our data on the variables ranges from 1994 to 2014. In addition, the real exchange rate between NPR and INR has been calculated as

*Real exchange rate*

$$= \text{Nominal exchange rate between NPR and INR} \times \frac{\text{India's consumer price index}}{\text{Nepal's consumer price index}}$$

**Methodology and Empirical Findings**

Empirical studies have found that time series usually are nonstationary, which could pose a problem of spurious correlation. For example, even if two time series have no theoretical relationships between them but statistical tests may show a relationship. Therefore, we first applied the augmented Dickey-Fuller test on all time series in our model shown in equation (1). The results from above test are shown in the table below.

Variable	t-statistic	Critical Value at 5%	Stationarity
XTM	-2.57258 <	-2.98104	Nonstationary
ΔXTM	-7.34352 >	-2.98623	Stationary
NRGDP	-2.63482 <	-2.97185	Nonstationary
ΔNRGDP	-3.36433 >	-2.97626	Stationary
IRGDP	-0.42933 <	-2.97185	Nonstationary
ΔIRGDP	-3.38468 >	-2.97626	Stationary
REX	-1.848367 <	-3.00000	Nonstationary
ΔREX	-4.616222 >	-3.012363	Stationary

The above results clearly indicate that all variables included in our model are nonstationary at their levels but stationary in their first differenced values (because corresponding t-statistics are greater than the critical value at 5% significance level), which leads to the possibility of cointegration (long-run relationship) among the variables. As a next step, we applied Johansen cointegration test to see if a long-run relationship exists among our model variables. The results of the cointegration test are given below.

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.635584	52.73312	47.85613	0.0162
At most 1 *	0.629348	33.5534	29.79707	0.0176
At most 2	0.395928	14.69606	15.49471	0.0657
At most 3 *	0.236175	5.118903	3.841466	0.0237
Trace test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

As shown in the table above, the trace statistic (52.73312) for no cointegrating vector is greater than the corresponding 5% critical value (47.85613) rejecting the null hypothesis of no cointegration. This implies that there does exist a long-run relationship among the model variables.

Based on normalized cointegrating coefficients, the model shown by equation (1) is estimated as following:

$$XTM_t = 6.607134 + 8.49E^{-11}NRGDP_t - 2.08E^{-13}IRGDP_t + 5.73006REX_t \quad (2)$$

t-value =                      (1.17039)                      (-1.72166)                      (3.65837)

The estimated value of the coefficient associated with the variable REX, that is,  $\beta_3$  in equation (2) is greater than one and is statistically significant. This satisfies the Marshall-Lerner condition and implies that a one unit increase in real exchange rate between Nepalese rupee and Indian rupee raises Nepal's trade balance by 5.73006 units, meaning that a devaluation of Nepalese rupee against the Indian rupee will improve Nepal's trade balance with India.

#### **IV. Summary and Conclusions**

Nepal is having a trade deficit with India for so long. And the trade deficit does not seem to shrink over time, rather has been increasing. As a consequence, most of the remittances that come to the country through foreign employment of Nepalese workers go to pay for the country's trade deficit with India and contribute almost nothing to the formation of capital in the country. In order to curb its trade deficit a country can use several measures and one of them is to devalue the domestic currency. Devaluing of domestic currency helps lower the price of the country's exports and helps make imports more expensive to domestic consumers. Such a measure lowers the imports and promotes the exports and thereby lowers a country's trade deficit. While even developed countries, such as the United States, are taking measures to curb their trade deficit, a question suddenly comes to anybody's mind if Nepal can also lower its trade deficit with India by devaluing its currency. Nepalese currency (NPR) has been tied to Indian currency (INR) at INR 1.00 = NPR 1.60 for so long, which many researchers believe is unrealistic and a major contributor of Nepal's trade deficit with India.

The purpose of this study, therefore, is to examine if devaluing of NPR can help curb or lower Nepal's trade deficit with India. The answer is provided by the Marshall-Lerner condition. Since, in this study, we are taking up the case of Nepal, we are trying to see if the Marshall-Lerner condition is satisfied on the trade between Nepal and India. Satisfaction of this condition will lead us to conclude that devaluing NPR will lead to a greater Nepalese export to India and a smaller Nepalese import from India, thereby, lowering Nepal's trade deficit with India.

Several studies have been done on testing the Marshall-Lerner (M-L) condition on trade between two countries or group of countries. To our knowledge, the Marshall-Lerner condition has never been tested on trade between Nepal and India, which this study has undertaken.

The satisfaction of Marshall-Lerner condition requires that the sum of the absolute value of exchange rate elasticities of export and import be greater than unity. In terms of our model, as represented by equation (1), the M-L condition requires that the estimated value of the coefficient associated with the variable REX,  $\beta_3$ , be greater than one and statistically

significant. Since the coefficient,  $\beta_3$ , in equation (2) has been estimated at 5.73006, which is greater than 1 in absolute value and is also statistically significant, it satisfies the Marshall-Lerner condition. The satisfaction of the M-L condition implies that a depreciation or devaluation of Nepalese rupee will improve Nepal's trade balance with India.

By how much NPR needs to be depreciated or devalued to eliminate Nepal's trade deficit with India will depends on exchange rate elasticities of Nepal's export to and import from India, which could be a topic of further research.

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