Integral Research
(ISSN: 3048-5991) Coden: IRABCA

Research Article
(Peer-reviewed, Open Access & Indexed Multidisciplinary Journal)
Journal home page: https://integralresearch.in/
Vol. 03, No. 08, August. 2026

Asymmetric Impact of Exchange Rate on Exports and Imports in India

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Abstract

In this paper, author econometrically verified the asymmetric shocks of exchange rate of Rupee US Dollar on Indian exports and imports during 1970-2025 applying NARDL model. The paper revealed that exchange rate has suffered from short run asymmetry and long run symmetry when negative responses of cumulative dynamic multiplier of exchange rate of previous period is positively related with incremental export in the long run and negatively associated with both the positive and negative responses in the short run during 1970-2025. On the other hand, both the positive and negative responses of cumulative dynamic multiplier of exchange rate of previous period and current period are negatively associated with incremental import in the short run during 1970-2025 while no long run relationship was found significant and there was no asymmetry in the short run as well as in the long run. The cointegration equations in both incremental export and import are diverging away from the equilibrium.

Keywords: Exchange rate, exports, imports, asymmetry, positive changes of cumulative dynamic multiplier, negative changes of cumulative dynamic multiplier.
JEL Classification Codes-C22, F10, F31, G15, O24, P45

Introduction

Fundamentally, exchange rate changes (either depreciation or appreciation) are chief determinants of exports and imports of a nation in international trade irrespective of demand elasticities and other shocks where elasticities of demands for exports and imports, exchange rate regimes, uncertainties like economic crisis, war, natural calamities, trade agreements, political stabilities and relationship among trading partners are other relevant causes. Secondly, the behaviours of nominal and real effective exchange rates affected a country's exports and imports volume if tariff policy is unchanged. Thirdly, tariff, quota, communication and technology change have great influence on the international trade volume other than exchange rate changes. Fourthly, in a simple Auto Regressive Distributed Lag model of exchange rate at different periods is differently related with exports and imports which may be significant or insignificant. Ordinary Least Square observations are far different from Auto Regressive Distributed Lag model in explaining the association between exchange rate and volume of trade. Fifthly, in the dynamic model of Auto Regressive Distributed Lag framework, the positive and negative changes of cumulative dynamic multiplier of exchange rate behaviours are the chief determinants of asymmetric impacts of exports and imports where their convergence and divergence patterns showed the long run and short run asymmetry. This analysis is the modification of long run cointegration between exchange rate and trade volume of a nation. However, the role of government policy towards the exchange rate behaviour is significant for growth and sustainable development of a nation.

Received **09 July 2026**; Accepted **27 July 2026**. Available online: **30 July 2026**. Published by SAFE. (Society for Academic Facilitation and Extension)

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In this paper, the asymmetric behaviour of India's exchange rate (especially in Rupee-US Dollar nominal rate) and the nature of changes of exports and imports of India during 1970-2025 have been examined through NARDL approach.

Literature review

Exports will catapult if nominal exchange rate depreciates while imports will be cheaper when exchange rate appreciates (Khatimah,2026). If real exchange rate appreciates then the domestic industry feared for loss due to decrease in country's export (Taglioni,2012).The exchange rate is the determinant of trade where the intra-industry trade, firm's market power and heterogeneity ,economies of scale and consumer's choices are inter-connected(Ottaviano, Di Mauro & Taglioni ,2008). The export and exchange rate movement depend on monetary policy, global oil price, and growth as was evident in US-Cannada exchange rate changes (Abeer Reza,2022). Export increases if there is increase in value added exchange rate which was verified in Nepal during 2007-2021 in 33 industries while traditional theory revealed that exchange rate appreciation reduces exports (Dahal et al.,2025). Thus, Patel et al. (2019) proposed the value-added REER, which aims to overcome the limitations of export competitiveness.

Banu & Malhotra (2021) examined that India's exports and imports are positively related with exchange rate during 2000-2020.

In India, the asymmetric exchange rate pass through is favorable to exchange rate appreciation which was found from the study of Sengupta & Sinha Roy (2024) during 1991-2025. When the 25 nations were studied, the industrialized countries such as the US, China, Germany, Japan, the UK, and France showed the nature of partial pass-through, while emerging nations such as Bangladesh, Sri Lanka, and Indonesia have showed higher pass-through levels.

In Turkey, the Granger causality test during 2010-2019 showed that there is one way causality from exchange rate to import (Alim &Erilli,2021).

The relationship between exchange rate and balance of trade depends on many factors such as exchange rate regime, elasticity of demand and time lag Cointegration analysis in Turkey during 2018-2024 suggested that currency depreciation does not improve balance of trade (Iazil,2025).

By GVC analysis in cross country studies in 46 countries during 1995-2011, it was found that a 10 percent real effective depreciation in an economy's currency was associated with a 1.5 percent of GDP increase in real net exports with substantial cross-country variation. Thus, effects of exchange rate depreciation on exports are stronger for those economies during the period of economic slack than the countries of normal financial systems. The exchange rate changes have also strong effects on export and import prices. Even, GVC expansion has weakened trade elasticities over time (Leigh et al.,2017).

Asymmetry in positive responses of depreciation is insignificant while negative responses is significant which implies that REER showed both asymmetry in short run and long run for import while in export model,

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positive responses showed positive relation and negative responses showed negative relation in Vietnam during 2009-2022 by applying ARDL model (Hong Nga et al.,2024). The volatility of exchange rate might have negative impact on exports of agricultural raw materials, manufactured goods, and machinery and transport equipment. In contrast, it was found to have a positive and significant impact on trade in fuels and imports of chemicals and textiles from Russia during 2004-2018(Tarasenko,2021).

In India, there is positive relationship between export and exchange rate but negative relationship between import and exchange rate during 2006-2015(Gondaliya & Dave,2015).

By applying NARDL model it was found that the asymmetric shock of exports from rupee dollar rate during 1956-2023 in India passed through 95% confidence interval where positive responses converged to positive long run limit at below zero level while negative responses became stationary with negative long run limit at below zero level and positive long run limit created v shaped cycle. On the other hand, asymmetry shock of import from rupee dollar rate during 1956-2023 passed through 95% confidence interval, and became stationary at above zero while positive responses converged to positive long run limit showing small fluctuation but negative responses became stationary with negative long run limit at below positive long run limit producing v shaped cycles (Bhowmik,2025).

Purpose of the research

India's exchange rate variability is well known. It has great impacts on both India's exports and imports respectively since long. Therefore, the fundamental aim of this paper is to examine the asymmetric shocks of exchange rate (Rupee -US Dollar) on India's exports and imports from 1970 to 2025 through ARDL approach.

Source of data and Methodology

The data on India's exports, imports and the nominal exchange of Rupee against US$ from 1986 to 2025 were collected from the Reserve Bank of India and the same data from 1970 to 1985 were collected from the UNCTAD.

ARDL model was estimated by taking the model of Pesaran & Shin (1999). Bounds test was done by using Pesaran, Shin &Smith, (2001) model, Asymmetry of ARDL model was used by following Shin, Yu & Greenwood-Nimmo (2014). Heteroscedasticity and serial correlation of the ARDL model were tested by using Breusch & Pagan (1979) model. CUSUM test for stability was done by using Page (1954) model.

Empirical Observations

[1] Exchange rate Asymmetry on exports

Following Pesaran & Shin (1999) model, and following Shin, Yu & Greenwood-Nimmo (2014) model of asymmetric impact, the ARDL (3,3) estimate between incremental export and exchange of India from 1970 to 2025(adjusted 1974-2025) states that in the long run, incremental export is positively related with its previous year and is positively associated with negative response of cumulative dynamic multiplier of exchange rate of earlier period at 5% significant level. On

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the contrary, in the short run, the incremental export is negatively associated with its previous two years' exports and incremental negative response of cumulative dynamic multiplier of exchange rate of current period and earlier period, as well as positive responses of earlier two periods at 5% significant level. Besides, it is also positively related with positive response of incremental positive response of cumulative dynamic multiplier of exchange rate of current period significantly. This model is significant where AIC is least among 20 automatically selected models assuming no trend and restricted constant (Table 1).

Table 1: ARDL (3,3) model between export and exchange rate

Variable, d(x)=dependent	Coefficient	Standard Error	t-statistic	Probability
x_{t-1}	0.741459	0.330767	2.241635*	0.0306
Ex_{t-1}^{cdm+}	-144.4364	709.0611	-0.203701	0.8396
$Ex_{t-1}^{(cdm)-}$	13814.84	7091.664	1.948040**	0.0585
C	-6005.971	12807.64	-0.468937	0.6417
$d(x_{t-1})$	-0.870707	0.346268	-2.514549*	0.0160
$d(x_{t-2})$	-1.499967	0.365318	-4.105925*	0.0002
$Ex_t^{d(cdm)+}$	17119.80	3446.877	4.966758*	0.0000
$Ex_t^{d(cdm)-}$	-23690.33	9275.157	-2.554170*	0.0146
$Ex_{t-1}^{d(cdm)+}$	-1019.977	4860.062	-0.209869	0.8348
$Ex_{t-1}^{d(cdm)-}$	-29111.29	12866.78	-2.262516*	0.0292
$Ex_{t-2}^{d(cdm)+}$	-10145.38	4823.220	-2.103444*	0.0418
$Ex_{t-2}^{d(cdm)-}$	1195.670	11602.18	0.103056	0.9184

Where R^2=0.621, F=5.970*, AIC=24.406, SC=24.856, DW=1.698, n=52, ARDL(3,3), Ex=exchange rate ,x=export, Lag=max 4,*=significant at 5% level,**=significant at 10% level, cdm+=positive responses of cumulative dynamic multiplier, d(cdm)+= incremental positive responses of cumulative dynamic multiplier, (similar for negative changes for cdm-),t=current period, t-1=previous first period,t-2=previous second period,t-3=previous third period. Thus, 〖Ex〗_t^(d(cdm)+) =incremental positive changes of cumulative dynamic multiplier of Exchange rate at period t. And 〖Ex〗_t^(d(cdm)-)= incremental negative responses of cumulative

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dynamic multiplier of Exchange rate at period t. 〖Ex〗_(t-1)^(cdm+)= positive responses of cumulative dynamic multiplier of Exchange rate at period t-1 and 〖Ex〗_(t-1)^((cdm)-) = negative responses of cumulative dynamic multiplier of Exchange rate at period t-1 and so on.

Source-Computed by author

Following the Pesaran, Shin & Smith (2001) model, the Bounds test revealed that F=3.2328 which is greater than the value of I (0) and asymptotic at 10% level of significance as well as asymptotic at 5% significant level which are shown below in Table 2. Thus, the result implies that no levels relationship at null hypothesis is accepted at 10% level.

Table 2: Bounds test values of I (0) and I (1)

Sample size	10% significant level		5% significant level		1% significant level	
	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)
50	2.788	3.513	3.368	4.178	4.695	5.758
55	2.748	3.495	3.303	4.100	4.610	5.563
Asymptotic	2.630	3.35	3.100	3.870	4.130	5.0

Source-Computed by author

In Table 3, the estimated Error Correction model suggests that the incremental export is negatively associated with incremental exports of previous two years significantly at 5% level. It is negatively related with negative response of incremental cumulative dynamic multiplier of exchange rate at current period and earlier period respectively which are significant at 5% level. It is also negatively related with the positive response of incremental cumulative dynamic multiplier of exchange rate of earlier two periods while positively related with positive response of incremental cumulative dynamic multiplier of exchange rate at current period significantly. Cointegration is significant but divergent.

Table 3: Error correction model5

Variable, d(x)=dependent	Coefficient	Standard Error	t-statistic	Probability
COINTEQ*	0.741459	0.198866	3.728430*	0.0006
$d(x_{t-1})$	-0.870707	0.314272	-2.770553*	0.0082
$d(x_{t-2})$	-1.499967	0.339121	-4.423100*	0.0001
$Ex_t^{d(cdm)+}$	17119.80	3055.104	5.603674*	0.0000
$Ex_t^{d(cdm)-}$	-23690.33	8005.007	-2.959439*	0.0050
$Ex_{t-1}^{d(cdm)+}$	-1019.977	3824.523	-0.266694	0.7910
$Ex_{t-1}^{d(cdm)-}$	-29111.29	9503.092	-3.063350*	0.0038
$Ex_{t-2}^{d(cdm)+}$	-10145.38	4135.164	-2.453440*	0.0183
$Ex_{t-2}^{d(cdm)-}$	1195.670	9575.318	0.124870	0.9012

Where R^2=0.621, F=8.824*, DW=1.698, AIC=24.29, SC=24.62, n=52, *=significant at 5% level. 〖d(x)〗_(t-1)) = incremental export for t-1 period, same for other periods.

Source-Computed by author

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Research Article
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The following estimated cointegrating equation states that it is significantly diverging away from the equilibrium level at the speed of adjustment of 74.14% per annum. Export at previous period is negatively associated with negative responses of cumulative dynamic multiplier of exchange rate of previous period significantly at 5% level while it is positively associated with positive responses of cumulative dynamic multiplier of exchange rate of previous period which is insignificant.

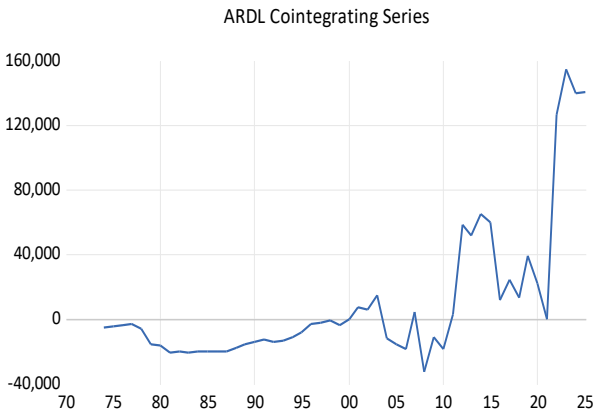
CE=0.741459x_(t-1)- [194.800272〖Ex〗_(t-1)^((cdm)+) -18631.979〖Ex〗_(t-1)^((cdm)-)+8100.209124]

(3.728)* (0.2130) (-4.838)* (0.4327)

Where CE=cointegrating equation, *=significant at 5% level

The cointegrating equation of ARDL model is depicted in Figure 1 which is shown below which is gradually moving towards equilibrium level repeatedly but ultimately it is diverging away due to positive speed of adjustment and insignificant relationship with positive responses of cumulative dynamic multiplier of exchange rate.

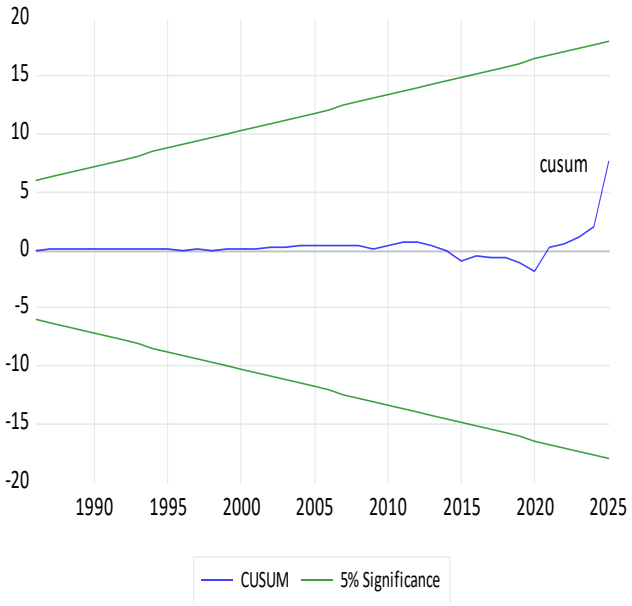
Figure 1: Cointegrating equation



Source-Plotted by author

The model is found as stable because the CUSUM line moves around ±5% significant level which is shown below in Figure 2 using Page (1954) model.

Figure 2: Stability of the model



Source-Plotted by author

Breusch-Pagan-Godfrey Heteroskedasticity Test (1979) assured that F=5.709420 whose probability of F (11,40) is 0.000 (significant at 99%) and nR2=31.76725 whose probability of Chi-square (11) is 0.0008 which is significant, therefore null hypothesis of homoscedasticity is rejected. So that, there exists no problem of heteroscedasticity.

Breusch-Godfrey Serial Correlation LM Test (2 lags) (1979) states that F=1.6394 whose probability F (2,38) =0.2075 and nR2=4.1306 whose probability of Chi-square (2) =0.1268 which are accepted at null hypothesis of no serial correlation(H0).

The exchange rate has produced symmetric effect in the long run because the symmetry test found that F=3.6989 whose probability is 0.0616 and the Chi-square (1) =3.6989 whose

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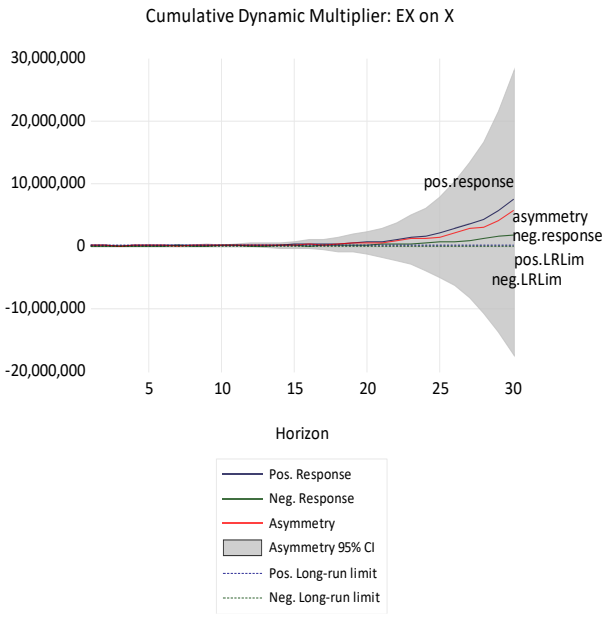
probability is 0.0544 where null hypothesis(H0) verified symmetric coefficient. On the other hand, in the short run, F=4.508 whose probability is 0.0400 and the Chi-square (1) =4.5089 whose probability is 0.0337 which are rejected at null hypothesis(H0). So, in the short run there is asymmetry.

In Figure 3, the asymmetric impact of exchange rate on export during 1970-2025 has been plotted in which the asymmetry line is upward after 15 horizons which exists above the equilibrium level along with positive and negative responses of cumulative dynamic multiplier of exchange rate, on the other hand, the positive and negative long run limits of cumulative dynamic multiplier of exchange rate merged with equilibrium level. The asymmetry line passed through 95% confidence interval. The result was obtained by applying the Shin, Yu & Greenwood-Nimmo (2014) model.

Figure 3. Asymmetry



Source-Plotted by author

[2] Exchange rate Asymmetry on imports

Using the model of Pesaran & Shin (1999), and following Shin, Yu & Greenwood-Nimmo (2014) model for asymmetry, the ARDL (4,3) estimation of incremental imports and exchange rate of India from 1970-2025 (adjusted 1974-2025) stated that there is no significant long run relationship between them but in the short run, incremental import is negatively and positively related to the incremental exchange rate of previous second and third year significantly at 10% level. The negative responses of incremental cumulative dynamic multiplier of exchange rate of current year are positively associated with incremental import which are significant at 10% level. The positive responses of incremental cumulative dynamic multiplier of exchange rate of previous second year are negatively associated with incremental import which is significant at 5% level. Other relationships are insignificant. The estimated model is automatically chosen from the best 20 models where AIC is minimum assuming there is no trend with maximum 4 lags. In Table 4, the results are shown in detail.

Table 4: ARDL (4,3) estimation of import and exchange rate

Variable, d(M)=dependent variable	Coefficient	Standard Error	t-Statistic	Probability
M_{t-1}	0.198607	0.235541	0.843196	0.4043
Ex_{t-1}^{cdm+}	669.1738	660.5237	1.013096	0.3173
Ex_{t-1}^{cdm-}	6275.557	7679.381	0.817196	0.4188
C	1278.891	12514.74	0.102191*	0.9191
$d(M)_{t-1}$	0.034976	0.263153	0.132911	0.8949
$d(M)_{t-2}$	-0.862817	0.216288	-3.989200*	0.0003
$d(M)_{t-3}$	0.354785	0.207704	1.708128*	0.0956
$Ex_{t}^{d(cdm)+}$	3505.223	3627.597	0.966266	0.3399
$Ex_{t}^{d(cdm)-}$	-15165.64	9090.988	-1.66820**	0.1033
$Ex_{t-1}^{d(cdm)+}$	1119.359	5066.424	0.220937	0.8263
$Ex_{t-1}^{d(cdm)-}$	-21764.23	13722.39	-1.586038	0.1208
$Ex_{t-2}^{d(cdm)+}$	-11891.95	4968.071	-2.393676*	0.0216
$Ex_{t-2}^{d(cdm)-}$	8731.757	12374.94	0.705600	0.4846

Where R^2=0.5711, F=4.328*, DW=2.089,

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AIC=24.347, SC=24.835, n=52, *=significant at 5% level, **=significant at 10% level, M=import, Ex=exchange rate. M_(t-1)=import for t-1 period, 〖d(M)〗_(t-1)=incremental import at t-1 period, and similar for other periods.

Source-Computed by author

By using the model of Pesaran, Shin &Smith, (2001), the Bounds test has assured that F=2.045975 which is less than the values of I(0) and I(1) at 1%,5%, and 10% significant levels where H0=no levels relationship which is shown in Table 5 below.

Table 5: Bounds test

Sample size	10% significant level	5% significant level	1% significant level			
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
50	2.788	3.513	3.368	4.178	4.695	5.758
55	2.748	3.495	3.303	4.10	4.610	5.563
Asymptotic	2.630	3.35	3.10	3.870	4.130	5.00

Source-Computed by author

The estimated Error Correction model states that the incremental import is negatively and positively associated with incremental import of previous second and third year respectively which are significant at 5% level during 1974-2025. Besides, the incremental imports are negatively related to the negative changes of cumulative dynamic multiplier of exchange rate of current year and previous first year respectively which are significant at 10% level and 5% level. But the incremental import and positive changes of cumulative dynamic multiplier of exchange rate of previous second year are inversely related which is significant at 5% level. The cointegration is significant but divergent (Table 6).

Table 6: Estimated Error Correction model

Variable	Coefficient	Standard Error	t-Statistic	Probability
COINTEQ*	0.198607	0.066899	2.968742*	0.0049
$d(M)_{t-1}$	0.034976	0.197069	0.177481	0.8600
$d(M)_{t-2}$	-0.862817	0.175026	-4.929661*	0.0000
$d(M)_{t-3}$	0.354785	0.165551	2.143059*	0.0379
$Ex_t^{d(cdm)+}$	3505.223	3238.475	1.082368	0.2853
$Ex_t^{d(cdm)-}$	-15165.64	7981.446	-1.90011**	0.0643
$Ex_{t-1}^{d(cdm)+}$	1119.359	4089.663	0.273704	0.7857
$Ex_{t-1}^{d(cdm)-}$	-21764.23	8165.461	-2.665401*	0.0109
$Ex_{t-2}^{d(cdm)+}$	-11891.95	4409.608	-2.696828*	0.0100
$Ex_{t-2}^{d(cdm)-}$	8731.757	8717.407	1.001646	0.3223

SC=24.60, n=52, maximum lag 4, *=significant at 5% level, **=significant at 10% level,

Source-Computed by author

The estimated cointegrating equation revealed that it is significantly diverging away from equilibrium level at the speed of adjustment of 19.86% per annum. Import at previous period is negatively associated with negative responses of cumulative dynamic multiplier of exchange rate of previous period significantly at 5% level while it is negatively related with positive responses of cumulative

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dynamic multiplier of exchange rate of previous period which is insignificant at 5% level.

The cointegration equation is estimated below.

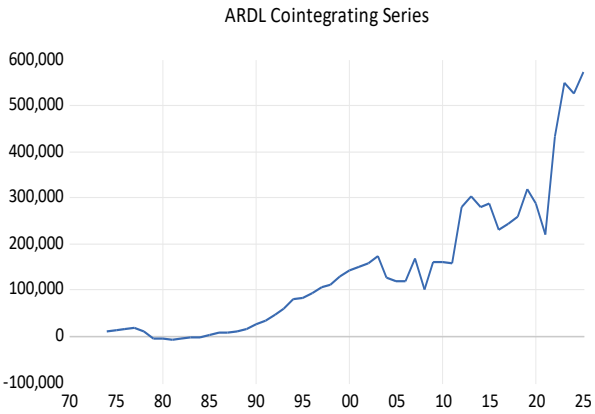
CE=0.198607M_(t-1) – [3369.3301〖Ex〗_(t-1)^(cdm+)-31597.8033〖Ex〗_(t-1)^(cdm-)-6439.294]

(2.968)* (-0.539) (-2.252)* (-0.105)

Where CE=cointegrating equation, *=significant at 5% level

The above cointegrating equation started to diverge from the 1985 with creating cycles and went on upward moving which is shown below in Figure 4.

Figure 4: Cointegrating equation



Source-Plotted by author

The stability of the model is confirmed because the CUSUM line passes through ±5% significant level following Page (1954) model which is depicted in Figure 5 below.

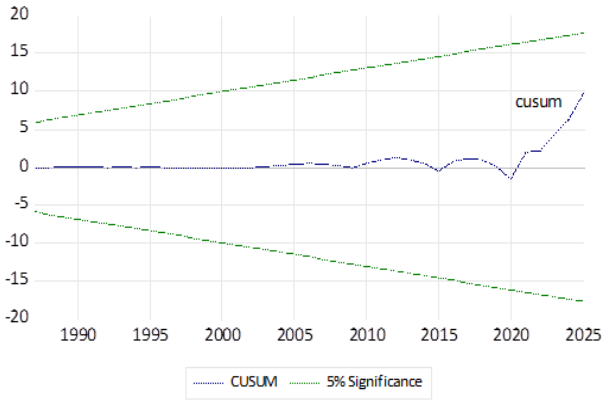


Figure 5: Stability of the model

Source-Plotted by author

Breusch-Pagan-Godfrey Heteroskedasticity Test (1979) stated that F=3.2909 whose probability of F (12,39) =0.0024 and nR2=26.162 whose probability of Chi-square (12) =0.0102, so that null hypothesis of homoskedasticity is significant. It concludes that there is no problem of heteroscedasticity.

Breusch-Godfrey Serial Correlation LM Test (1979) assured that F=2.713 whose probability of F (2,37) =0.0795 and nR2=6.6506 whose probability of the Chi-square (2) =0.036 which implied that there is no problem of serial correlation at lag 2.

In the period of long run, exchange rate has revealed symmetric effect because the symmetry test found that F (1,39) =0.5157 whose probability is 0.4769 and the Chi-square (1) =5157 whose probability is 0.4727 where null hypothesis follows symmetric coefficient while in the short run, F (1,39) =4992 whose probability is 0.4840 and Chi-square (1) =0.4992 whose probability is 0.4798 which are accepted at null hypothesis. So, in the short run, there prevails symmetry.

In Figure 6, the impact of the cumulative dynamic multiplier of exchange rate on import

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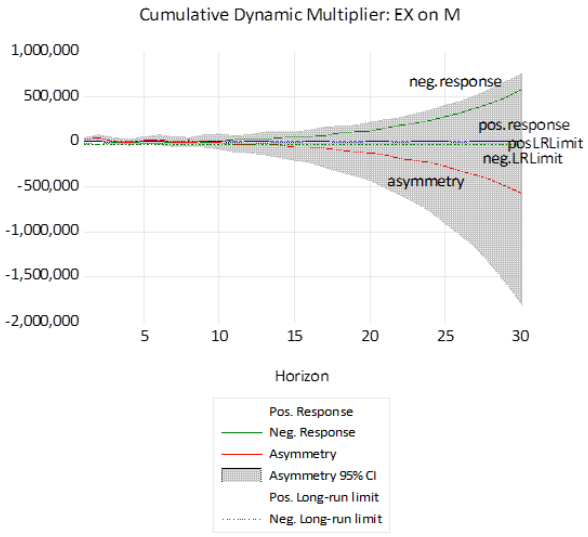
Journal home page: https://integralresearch.in/
Vol. 03, No. 08, August. 2026

during 1974-2025 is depicted below. The asymmetry curve is diverging from the lower range of origin. Moreover, the negative response of cumulative dynamic multiplier of exchange rate is upward rising above the origin while the positive response of cumulative dynamic multiplier of exchange rate passes above the origin marginally. Both the positive and negative long run limits nearly merged with origin or equilibrium level. The asymmetry line passed through 95% confidence interval. The results were obtained by following Shin, Yu & Greenwood-Nimmo (2014) model.

Figure 6: Asymmetry of exchange rate on imports



Source-Plotted by author

Future research and limitation

The variabilities of NEER and REER are important determinants in explaining the changes of export and import. Besides, inflation rate, GDP growth rate other than exchange rate are major factors which can affect volumes of exports and imports. Exchange rate pass through should be an important consideration to explain. Even, the exchange rate asymmetry can be analysed in various exchange rate regimes in India. All these factors should be considered for fluctuations of trade volumes in cases of future research.

Conclusions

The paper concludes that the incremental export is positively associated with negative responses of cumulative dynamic multiplier of exchange rate of previous period in the long run. On the other hand, in the short run, it is positively and negatively correlated with both positive and negative responses of cumulative dynamic multiplier of exchange rate of current and previous periods which were significant at 5% level during 1970-2025. Thus, there are short run asymmetry and long run symmetry where cointegration is divergent with the speed of adjustment of 74.14% per annum showing stability of the ARDL (3,3) model without producing the problems of serial correlation and heteroscedasticity.

The incremental import is negatively related to both positive and negative responses of cumulative dynamic multiplier of exchange rate of previous and current periods significantly in the short run while long run relationships were insignificant. The ARDL (4,3) model is stable without serial correlation and heteroscedasticity problems. Cointegration is divergent indicating the speed of adjustment of 19.86% per annum from below the equilibrium level. It is significant showing negative relationship between

Received 09 May 2026; Accepted 27 July 2026. Available online: 30 July. Published by SAFE. (Society for Academic Facilitation and Extension)

cumulative dynamic multiplier of exchange rate of previous period and incremental import during 1970-2025.There are symmetry of exchange rate on import both in the short run and in the long run.

References:

Abeer Reza, P.A. (2022, April). *Exports and the Exchange Rate: A General Equilibrium Perspective.* Staff working paper 2022-18. https://www.bankofcanada.ca/2022/04/staff-working-paper-2022-18/

Alim, C., & Erilli, N.A. (2021). The relationship between exchange rates, foreign trade and economic growth: An application on Turkey. **Theoretical and Applied Economics,** 28(3(628), 157-168. https://store.ectap.ro/articole/1562.pdf

Banu, M., & Malhotra, R. (2021). Impacts of exports and imports on exchange rates in India. *Anusandhan The Research Repository of GIBS,*4(1), https://gitarattan.edu.in/wp-content/uploads/2023/04/19-1.pdf

Bhowmik, D. (2025). *Exchange rate in India: 1823-2023.* New Delhi: Kunal Books.

Breusch, T.S., & Pagan, A.R. (1979). A Simple Test for Heteroscedasticity and Random coefficients variation. *Econometrica,* 47(5),1287-1294, doi.org/10.2307/1911963

Dahal, A., Byanjankar, R., Jangam, B.P., & Rath, B.N. (2025). Re-assessing the role of exchange rates in export dynamics: Evidence from a disaggregated industry-level analysis in the case of Nepal. *Economic Analysis and Policy*, 85,1752-1759, https://doi.org/10.1016/j.eap.2025.01.027. (https://www.sciencedirect.com/science/article/pii/S031359262500027X)

Gondaliya, V., & Dave, P. (2015). *The Impact of Exports and Imports on Exchange Rates in India. International Journal of Banking, Finance & Digital Marketing*, 1(1), 01-08, https://utu.ac.in/bvp/download/Publication/7.

Hong Nga, N., Hoang An, P., Thi Kim Loan, V., & Cuong, T. Q. K. (2024). *Impact of exchange rate changes on export-import dynamics in Vietnam. Cogent Economics & Finance,* 12(1). https://doi.org/10.1080/23322039.2024.2409415

Iazil, G. (2025, March). The Effect of Real Effective Exchange Rate on Imports and Exports: An Application on Tãœrkiye, Eurasian Academy of Sciences Social Sciences *Journal, Eurasian Academy of Sciences*, 57(57), 65-80, https://doi.org/10.17740/eas.soc.2024.V57.05

Khatimah, H. (2026, April). *How Exchange Rates Affect Import and Export Activities*. https://ssrn.com/abstract=6622418 or http://dx.doi.org/10.2139/ssrn.6622418

Pesaran, M., & Shin, Y. (1999). An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis. In S. Strom, (ed) *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch centennial Symposium,* Cambridge University Press, Cambridge. https://www.cambridge.org/core/books/econometrics-and-economic-theory-in-the-20th-century/an-autoregressive-distributedlag-modelling-approach-to-cointegration-analysis/0A3624D5C624BED6E2A963190403653A

Leigh, D., et al. (2017). *Exchange Rates and Trade: A Disconnect?* IMF Working Paper no-

Received **09 May 2026**; Accepted **27 July 2026**. Available online: **30 July**. Published by SAFE. (Society for Academic Facilitation and Extension)

17/58. https://www.imf.org/-/media/files/publications/wp/2017/wp1758.pdf

Ottaviano G., Taglioni, D., & Mauro, F. di. (2008). *The Euro and the Competitiveness of European Firms, Economic Policy.* CEPR, CESifo, Sciences Po; CES; MSH, 24(57), 6-53. Handle: RePEc: oup: ecpoli: v: 24: y: 2009: i: 57: p: 6-53.

Pesaran, M.H., Shin, Y., &Smith, R.J. (2001). Bounds testing approaches to the analysis of level relationship. *Journal of Applied Economics,* 16, 289-326. https://www.jstor.org/stable/267854

Sengupta, D., & Roy, S. S. (2024). Export Prices, Exchange Rate Pass-through, and Global Value Chains: Some Indian Evidence. *Economic and political weekly*, 59, https://www.epw.in/journal/2024/46/global-value-chains/export-prices-exchange-rate-pass-through-and.html

Shin, Y., B. Yu, B., & Greenwood-Nimmo, M. (2014). Modelling Asymmetric Cointegration and Dynamic Multipliers in an ARDL Framework. in: R.C. Sickles, W.C. Horrace (Eds), Festschrift in Honor of Peter Schmidt, *Springer Science and Business* Media: New York.

Taglioni, D. (2012, March). *Exchange Rates and the Extensive Margin of Exports*. https://www.wto.org/english/res_e/reser_e/gtdw_e/wkshop12_e/taglioni.pdf

Tarasenko, I. (2021). The impact of exchange rate volatility on trade: The evidence from Russia. *Russian Journal of Economics*, 7(3), 213-232. https://doi.org/10.32609/j.ruje.7.57933

Received **09 May 2026**; Accepted **27 July 2026**. Available online: **30 July**. Published by SAFE. (Society for Academic Facilitation and Extension)