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Effects of Currency Depreciation on Trade Balances of Developing Economies: A Comprehensive Study on South Asian Countries

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Abstract: *This research paper is aimed to investigate the effect of currency depreciation on the Trade Balances of South Asian Countries. The analysis was based on Marshal-Lerner Model developed by Lerner, A. P. (1944) and J-curve. The Marshal-learner model is the extension of model of Marshall, A. (1923), which stated that devaluation or depreciation of currency makes exports relatively cheaper and imports relatively expensive.*
Making textual analysis of the available data from South Asian countries, the study makes predictions on the devaluation of currency, its causes and the consequences. The cross sectional data was tested via multiple regression analysis. Effects of currency depreciation on the trade balances of each individual country were then subjected to a comprehensive analysis. The study supports and confirms Marshal-Lerner Model highlighting that devaluation of currency does not always help improve balance of trade.
Keywords: *Trade Balance, currency depreciation, developing economies, currency devaluation*

I. Introduction

The role of Trade is very crucial for economic growth as well as economic development of a country. Trade surplus brings inflows into economy causing a straight road map for economic expansion. Trade policy, therefore, has remained a matter of core discussion among the economists and economic policy makers all over the world. Accompanied with ideas of industrialization, exporting value added products etc. the currency exchange rate has also succeeded in getting the attention of the economists and policy-makers. Despite theoretical development the relationship between Currency Exchange Rate and Trade Balance is fuzzy yet. The reason given by many economists is that theoretical work and most of the research work is focused on developed and capitalists economies such as the USA and other Transitional Countries. This research paper discusses the relation of Currency devaluation with Trade Balance in South Asia.

Broadly there are four schools of thoughts related to determine the relationship between Currency exchange rate and Trade balance which are: the Marshal-Lerner, the J-curve, the S-curve and the direct method for devaluation prediction.

The Marshal-learner model is the extension of Marshal's model which stated that devaluation or depreciation of currency makes export relatively cheaper and Import relatively expensive. Abba Lerner extended the work of Alferd Marshal and added the concept of elasticity of demand for export and import of the goods. Lerner explained that if the demand for export and import of the goods in a country is relatively price elastic then devaluation would positively affect the terms of trade (Lerner, 1944).

The J-Curve emphasize that effect of devaluation would emerge in long run because the volume of export and import is unlikely to be affected in short run due to trade agreements and switching costs etc. therefore, in short run devaluation may affect negatively.

The South Asian countries such as Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka have been experiencing annual Trade Deficit since 1970s to date. Interestingly such Trade Deficit has been observed in combination with continuous depreciation of their Currency with parity to US Dollar. Apparently this phenomenon appears to be in contradiction with Marshal's theoretical frame work. Alfred Marshal stated that devaluation or depreciation of currency makes export relatively cheaper and import relatively expensive, therefore devaluation may be an effective tool for earning surplus balance of trade (Marshall, 1923). In this study we have applied the contribution of Abba Lerner. Abba Lerner extended the work of Alfred Marshal with objective to apply the concept more practically under various scenarios. Abba Lerner developed a condition that if the demand for import and export of a country is elastic then the objective of surplus terms of trade may be achieved. If the demand for import and export is inelastic then devaluation would further increase the deficit (Lerner, 1944). The expensive import due to devaluation need to be compensated with cheap export by making arrangements to increase the volume of export, if it is required to observe the application of Marshal-

Lerner condition (Hooy& Chan, 2008). The analysis in this study includes calculation of elasticity of demand for export and import based Regression coefficient. Further the regressive and causative relationship of currency with export and import has been investigated based on time series econometric modeling. Magee (1973) made study on effect of depreciation US dollar on the trade balance of the USA. The case of depreciation of USD by 15% was observed during 1971. The analysis suggests that the Trade Balance was worsening immediately i.e. in short period of time the US economy faced negative terms of trade. However, as time passed, the economy experienced gradual improvement in the Trade Balance. Wilson (2001) supported the conclusion made by Magee (1973). The result of Magee (1973) were further confirmed by (Bahmani-Oskooee, 1985) .

II. Historical and Technical Analysis

Table 2.1 Historical Comparison of Currency exchange rate and Balance of Trade

Historical comparision of currency and balance of trande

	Bangladesh		India		Nepal		Pakistan		Srilanka	
year	RER	BOT (USD cuurent)	RER	BOT (USD cuurent)	RER	BOT (USD cuurent)	RER	BOT (USD cuurent)	RER	BOT (USD cuurent)
1970	0.0622	(377,188,130)	0.0465	(60,000,000)	0.0315	(1,082,294,109)	0.055	(691,985,406)	0.0288	(72,268,908)
1971	0.0644	(388,240,244)	0.0462	(225,758,407)	0.0296	(891,157,626)	0.055	(598,764,529)	0.0284	(47,386,172)
1972	0.0665	(506,696,079)	0.0472	227,667,166	0.0311	(805,561,777)	0.031	(484,834,891)	0.0280	(40,201,005)
1973	0.0662	(428,830,090)	0.0509	(440,035,610)	0.0315	(892,105,175)	0.031	(175,629,608)	0.0280	(34,843,750)
1974	0.0612	(828,227,082)	0.0564	(1,183,612,484)	0.0337	(1,222,979,484)	0.036	(622,599,988)	0.0273	(266,917,293)
1975	0.0408	(1,009,647,641)	0.0528	(984,582,198)	0.0319	(1,430,911,896)	0.040	(1,308,500,039)	0.0253	(283,166,904)
1976	0.0325	(1,299,731,011)	0.0431	587,357,822	0.0257	(1,621,765,139)	0.040	(1,154,100,279)	0.0202	(83,828,775)
1977	0.0328	(514,440,754)	0.0450	143,649,635	0.0266	(1,029,679,055)	0.042	(1,472,700,100)	0.0182	150,169,109
1978	0.0336	(1,319,720,435)	0.0457	(375,327,498)	0.0273	(1,889,267,382)	0.041	(1,646,299,965)	0.0108	(130,493,274)
1979	0.0314	(1,510,065,288)	0.0440	(2,171,755,213)	0.0257	(2,244,079,223)	0.040	(2,377,700,992)	0.0107	(405,202,312)
1980	0.0300	(2,244,162,440)	0.0446	(5,786,322,891)	0.0259	(3,014,849,114)	0.039	(2,750,997,413)	0.0112	(908,771,930)
1981	0.0252	(1,823,987,815)	0.0415	(5,098,877,306)	0.0254	(2,571,938,268)	0.040	(3,005,401,018)	0.0103	(709,922,078)
1982	0.0208	(1,940,950,000)	0.0387	(4,334,083,434)	0.0249	(2,605,382,271)	0.033	(3,631,473,157)	0.0100	(901,345,507)
1983	0.0195	(1,601,344,589)	0.0392	(4,398,723,181)	0.0247	(2,336,099,160)	0.031	(3,173,052,883)	0.0097	(780,492,988)
1984	0.0195	(1,903,333,362)	0.0362	(3,060,529,157)	0.0215	(2,273,551,367)	0.029	(3,599,825,997)	0.0101	(358,962,264)
1985	0.0184	(1,660,461,538)	0.0339	(5,559,179,838)	0.0203	(2,557,982,963)	0.027	(3,859,113,985)	0.0092	(714,617,084)
1986	0.0179	(1,453,444,835)	0.0355	(4,548,547,296)	0.0203	(2,253,285,919)	0.026	(3,434,207,960)	0.0095	(743,718,772)
1987	0.0183	(1,651,143,770)	0.0362	(3,838,531,827)	0.0211	(2,530,128,765)	0.025	(2,591,012,297)	0.0094	(701,902,174)
1988	0.0184	(1,813,076,879)	0.0355	(4,211,604,881)	0.0207	(2,856,701,402)	0.025	(3,110,044,798)	0.0095	(750,895,945)
1989	0.0186	(2,016,114,412)	0.0310	(3,362,657,478)	0.0184	(3,167,672,940)	0.023	(3,158,988,146)	0.0089	(663,550,624)
1990	0.0178	(2,232,102,153)	0.0297	(4,492,297,406)	0.0175	(3,694,722,324)	0.022	(3,133,969,068)	0.0093	(633,150,275)
1991	0.0173	(1,722,661,028)	0.0249	2,039,270	0.0153	(3,334,630,951)	0.022	(709,412,951)	0.0097	(910,273,145)
1992	0.0170	(1,509,549,041)	0.0238	(2,153,620,920)	0.0152	(3,372,374,806)	0.022	(1,541,375,331)	0.0099	(898,790,783)
1993	0.0175	(1,687,195,801)	0.0209	47,187,357	0.0139	(4,003,255,981)	0.021	(3,157,885,591)	0.0097	(986,879,139)
1994	0.0181	(1,642,094,826)	0.0218	(988,287,377)	0.0145	(3,909,354,873)	0.021	(1,433,344,479)	0.0100	(1,383,265,884)
1995	0.0192	(2,458,582,043)	0.0226	(4,249,564,808)	0.0144	(5,481,502,087)	0.022	(1,644,944,061)	0.0101	(1,360,273,171)
1996	0.0184	(3,094,229,713)	0.0219	(4,554,259,290)	0.0140	(6,570,069,557)	0.021	(2,864,555,918)	0.0106	(1,240,691,153)
1997	0.0181	(2,549,601,828)	0.0224	(5,148,239,516)	0.0139	(6,330,096,735)	0.020	(2,927,099,543)	0.0106	(1,065,689,100)
1998	0.0181	(2,182,026,432)	0.0219	(7,005,107,519)	0.0134	(6,950,579,638)	0.019	(648,129,008)	0.0105	(948,859,581)
1999	0.0180	(2,497,212,978)	0.0215	(8,770,215,957)	0.0136	(7,375,825,565)	0.018	(1,015,745,720)	0.0098	(1,218,700,453)
2000	0.0167	(2,472,788,710)	0.0208	(4,245,767,257)	0.0130	(7,781,580,764)	0.016	(922,155,110)	0.0092	(1,731,889,365)
2001	0.0155	(2,874,981,468)	0.0199	(4,254,870,065)	0.0123	(8,747,730,743)	0.014	(761,027,138)	0.0088	(981,970,222)
2002	0.0152	(2,269,650,009)	0.0199	(5,045,853,397)	0.0120	(7,987,639,841)	0.015	(65,362,131)	0.0089	(1,113,119,381)
2003	0.0159	(3,022,141,623)	0.0211	(4,233,284,370)	0.0127	(9,407,177,319)	0.016	494,007,171	0.0092	(1,138,427,269)
2004	0.0162	(3,025,191,099)	0.0219	(12,662,315,623)	0.0131	(10,558,738,699)	0.016	1,012,767,066	0.0092	(1,822,670,224)
2005	0.0155	(3,896,617,886)	0.0227	(22,898,356,390)	0.0140	(12,705,739,390)	0.017	(4,246,231,889)	0.0100	(2,179,492,537)
2006	0.0150	(3,881,819,535)	0.0226	(29,981,104,764)	0.0143	(14,410,654,425)	0.017	(10,185,676,497)	0.0103	(3,111,945,986)
2007	0.0160	(4,738,271,069)	0.0256	(49,726,426,951)	0.0164	(16,941,146,943)	0.018	(10,234,758,630)	0.0109	(3,356,827,501)
2008	0.0168	(6,692,012,826)	0.0254	(62,024,911,428)	0.0160	(21,270,267,889)	0.018	(18,080,760,338)	0.0131	(5,572,120,612)
2009	0.0177	(6,366,686,047)	0.0254	(73,425,843,079)	0.0153	(22,130,678,212)	0.018	(12,221,456,185)	0.0128	(2,731,110,933)
2010	0.0186	(6,633,666,216)	0.0297	(74,620,861,632)	0.0168	(23,576,586,957)	0.019	(10,344,993,950)	0.0136	(4,117,861,928)
2011	0.0187	(9,746,514,028)	0.0308	(120,782,447,109)	0.0158	(33,683,560,286)	0.020	(10,693,330,575)	0.0144	(8,612,700,922)
2012	0.0182	(11,938,270,090)	0.0289	(141,964,833,400)	0.0161	(38,934,842,154)	0.020	(18,860,016,460)	0.0128	

Source : World bank, IMF and others

RER stands for real exchange rate and BOT stands for balance of trade

Table 2.1 shows the historical trend of currency depreciation and balance of trade. It can be observed that currency of each country is continuously depreciating in comparison with US dollar. However, their Balance of Trade continuously remain in deficit from 1970 t0 2012.

Historical comparision of currency and balance of trande

	Bangladesh		India		Nepal		Pakistan		Srilanka	
year	RER	BOT (USD cuurent)	RER	BOT (USD cuurent)	RER	BOT (USD cuurent)	RER	BOT (USD cuurent)	RER	BOT (USD cuurent)
1970	0.0622	(377,188,130)	0.0465	(60,000,000)	0.0315	(1,082,294,109)	0.055	(691,985,406)	0.0288	(72,268,908)
1971	0.0644	(388,240,244)	0.0462	(225,758,407)	0.0296	(891,157,626)	0.055	(598,764,529)	0.0284	(47,386,172)
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1973	0.0662	(428,830,090)	0.0509	(440,035,610)	0.0315	(892,105,175)	0.031	(175,629,608)	0.0280	(34,843,750)
1974	0.0612	(828,227,082)	0.0564	(1,183,612,484)	0.0337	(1,222,979,484)	0.036	(622,599,988)	0.0273	(266,917,293)
1975	0.0408	(1,009,647,641)	0.0528	(984,582,198)	0.0319	(1,430,911,896)	0.040	(1,308,500,039)	0.0253	(283,166,904)
1976	0.0325	(1,299,731,011)	0.0431	587,357,822	0.0257	(1,621,765,139)	0.040	(1,154,100,279)	0.0202	(83,828,775)
1977	0.0328	(514,440,754)	0.0450	143,649,635	0.0266	(1,029,679,055)	0.042	(1,472,700,100)	0.0182	150,169,109
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1982	0.0208	(1,940,950,000)	0.0387	(4,334,083,434)	0.0249	(2,605,382,271)	0.033	(3,631,473,157)	0.0100	(901,345,507)
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1990	0.0178	(2,232,102,153)	0.0297	(4,492,297,406)	0.0175	(3,694,722,324)	0.022	(3,133,969,068)	0.0093	(633,150,275)
1991	0.0173	(1,722,661,028)	0.0249	2,039,270	0.0153	(3,334,630,951)	0.022	(709,412,951)	0.0097	(910,273,145)
1992	0.0170	(1,509,549,041)	0.0238	(2,153,620,920)	0.0152	(3,372,374,806)	0.022	(1,541,375,331)	0.0099	(898,790,783)
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1997	0.0181	(2,549,601,828)	0.0224	(5,148,239,516)	0.0139	(6,330,096,735)	0.020	(2,927,099,543)	0.0106	(1,065,689,100)
1998	0.0181	(2,182,026,432)	0.0219	(7,005,107,519)	0.0134	(6,950,579,638)	0.019	(648,129,008)	0.0105	(948,859,581)
1999	0.0180	(2,497,212,978)	0.0215	(8,770,215,957)	0.0136	(7,375,825,565)	0.018	(1,015,745,720)	0.0098	(1,218,700,453)
2000	0.0167	(2,472,788,710)	0.0208	(4,245,767,257)	0.0130	(7,781,580,764)	0.016	(922,155,110)	0.0092	(1,731,889,365)
2001	0.0155	(2,874,981,468)	0.0199	(4,254,870,065)	0.0123	(8,747,730,743)	0.014	(761,027,138)	0.0088	(981,970,222)
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2003	0.0159	(3,022,141,623)	0.0211	(4,233,284,370)	0.0127	(9,407,177,319)	0.016	494,007,171	0.0092	(1,138,427,269)
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2005	0.0155	(3,896,617,886)	0.0227	(22,898,356,390)	0.0140	(12,705,739,390)	0.017	(4,246,231,889)	0.0100	(2,179,492,537)
2006	0.0150	(3,881,819,535)	0.0226	(29,981,104,764)	0.0143	(14,410,654,425)	0.017	(10,185,676,497)	0.0103	(3,111,945,986)
2007	0.0160	(4,738,271,069)	0.0256	(49,726,426,951)	0.0164	(16,941,146,943)	0.018	(10,234,758,630)	0.0109	(3,356,827,501)
2008	0.0168	(6,692,012,826)	0.0254	(62,024,911,428)	0.0160	(21,270,267,889)	0.018	(18,080,760,338)	0.0131	(5,572,120,612)
2009	0.0177	(6,366,686,047)	0.0254	(73,425,843,079)	0.0153	(22,130,678,212)	0.018	(12,221,456,185)	0.0128	(2,731,110,933)
2010	0.0186	(6,633,666,216)	0.0297	(74,620,861,632)	0.0168	(23,576,586,957)	0.019	(10,344,993,950)	0.0136	(4,117,861,928)
2011	0.0187	(9,746,514,028)	0.0308	(120,782,447,109)	0.0158	(33,683,560,286)	0.020	(10,693,330,575)	0.0144	(8,612,700,922)
2012	0.0182	(11,938,270,090)	0.0289	(141,964,833,400)	0.0161	(38,934,842,154)	0.020	(18,860,016,460)	0.0128	

Source : World bank, IMF and others

RER stands for real exchange rate and BOT stands for balance of trade

Elasticity calculations are based on Trade Model. Trade model was simultaneously utilized by Goldstein and Khan (1985).
The import (M) and export (X) functions are given below:
M = f (Y, REX0)
X = f (Y, REX)
the left hand side represents real US imports or real exports to or from the rest of the world. us Y is real GDP for the US and ROW Y is the real GDP of the rest of the world. Finally ROW REX is the real exchange rate between the US and the rest of the world. It is clear from these equations that you need proxy world income and the real exchange rate which are ad-hoc at best and at worst misleading constructs.

The log linear representation of the import demand equation were deployed by Sawyer and Sprinkle (1996) and Orcutt (1950) are as follows:
$LM = \alpha + \beta LY + \gamma LREX + \varepsilon$
$LX = \alpha + \beta LY + \gamma LREX + \varepsilon$

The β for the Import equation would represent Income elastic of domestic people for their import; similarly the β for export would represent the income elasticity of foreign people for domestic exported goods and services. For the equation of Import γ represents the elasticity of demand for import and for the equation of export γ represents the elasticity of demand for exports.

Table 2.2 calculation of elasticity of demand for export and import

Calculation of elasticity of demand for Export and Import based Trade Model and summed as per Marshal-Lerner Model					
COUNTRY	Elasticity of demand for export	Elasticity of demand for Import	Lerner-Marshal total	Emprical Result	Effect of Currency Depreciation on BOT
BANGLADESH	2.01	-1.692	0.318	Inelastic Demand	NEGATIVE
INDIA	2.93	-2.8	0.13	Inelastic Demand	NEGATIVE
NEPAL	11.86	-9.87	1.99	Elastic Demand	POSITIVE
PAKISTAN	2.61	-2.3	0.31	Inelastic Demand	NEGATIVE
SRI LANKA	1.48	-1.23	0.25	Inelastic Demand	NEGATIVE
SRI LANKA	1.48	-1.23	0.25	Inelastic Demand	NEGATIVE
Source: Trade models					
$LM = \alpha + \beta LY + \gamma LREX + \varepsilon$					
$LX = \alpha + \beta LY + \gamma LREX + \varepsilon$					

The table 2.2 shows the elasticity total of Marshal-Lerner which was calculated based on Trade Model. The marshal-Lerner total of elasticity is relatively inelastic (e<1) for Bangladesh, India, Pakistan and Sri Lanka. However, the elasticity of demand for export and import for Nepal is relatively elastic. The Marshal-Lerner model suggests that if sum of elasticity of demand for export and import of a country is more than one i.e. relatively elastic, then currency depreciation would provide favorable outcome for trade balance. However, unfavorable effect would be experienced if the sum of elasticity is less than one i.e. relatively inelastic. The findings appear to showing practical dilemma the south Asian countries are facing that major exports of these countries are primary, unfinished or semi-finished goods and mostly agri-based whose demand may be assumed as inelastic. Simultaneously the demand for Import into home country is mostly based on technological and innovative products such as machine, plants etc whose demand is also inelastic.

Before making final conclusion it recommended to consider the Regressive and Causality relation of Currency with export and import. The regressive relation show whether export or import are regressed by the currency. If export and import are regressed by currency then we may be able to justify the findings based on Marshal-Lerner model. The repressiveness is calculated based on Vector Autoregressive (VAR) model.

Table 2.3 Results of VAR for Export

Results of VAR for Export					
Country	Beta coefficient	X-1	X-2	R-1	R-2
Bangladesh	B	0.633	0.35	0.317	-0.44
	T-stats	4.31	2.39	0.9	-1.3
INDIA	B	1.25	-0.26	6.1	-8.1
	T-stats	7.07	-1.5	0.97	1.07
NEPAL	B	0.83	0.5	2.56	-3.14
	T-stats	5.3	0.37	1.79	-2.21
PAKISTAN	B	0.7	0.21	0.488	-0.56
	T-stats	5.2	1.51	2.8	-3.2
SRILANKA	B	INSIGNIFICANT			
	T-stats				

The table 2.3 shows the findings of VAR for export of the countries. The significance of beta coefficients of variables is compared with T-stats. A beta is significant provided that t-stats is greater than 1.5. The export of Bangladesh is not regressed by currency at level as well as at first difference. Similarly Indian export neither is nor regressed by currency. However, export of Pakistan and Nepal is significantly regressed by currency. This shows that Export of Pakistan and Nepal is significantly affected by currency exchange rate. Export of Sri Lanka shows insignificant regression.

Table 2.4 Results of VAR for Import

Results of VAR for Import					
Country	Beta coefficient	M-1	M-2	R-1	R-2
Bangladesh	B	0.46	0.15	0.781	-0.68
	T-stats	6.01	0.97	2.68	-2.16
INDIA	B	1.13	-0.14	6.3	-8.67
	T-stats	5.2	-0.6	0.56	-0.77
NEPAL	B	0.845	0.149	5.39	-5.4
	T-stats	6.49	1.07	4.25	-4.24
PAKISTAN	B	0.8	0.16	0.34	-0.46
	T-stats	5.09	1.007	1.4	-1.8
SRILANKA	B	INSIGNIFICANT			
	T-stats				

The table 2.4 shows the findings of VAR for import of the countries. The import of Bangladesh, Nepal and Pakistan is significantly regressed by currency. However, it is insignificant for imports of India and Sri Lanka.

Table 2.5 Results of Granger Causality

Result of GRANGER CAUSALITY				
Country	casuality	EXPORT	IMPORT	RER
Bangladesh	export causes	N/A	YES	NO
	import causes	NO	N/A	YES
	RER causes	NO	YES	N/A
INDIA	export causes	N/A	YES	NO
	import causes	NO	N/A	NO
	RER causes	NO	NO	N/A
NEPAL	export causes	N/A	NO	NO
	import causes	YES	N/A	NO
	RER causes	NO	YES	N/A
PAKISTAN	export causes	N/A	NO	NO
	import causes	NO	N/A	NO
	RER causes	YES	NO	N/A
SRILANKA	INSIGNIFICANT			

The table 2.5 shows causality Results for export and import with respect to currency. The import of Bangladesh, Nepal and Pakistan is significantly CAUSED by currency. It means the value of import is significantly affected by currency exchange rate. However, the export of Pakistan is also influenced by exchange rate, but the export of other countries is not caused by currency exchange rate.

III. Conclusion

The cumulative elasticity of demand for export and import is relatively inelastic for all countries except Nepal, showing inverse relation of currency exchange rate with Trade Balance. The findings suggest that real exchange rate causes trade deficit to developing economies due to inelasticity of their exports in general it also notifies that the value of import is significantly affected by currency. Hence, if currency depreciates, the value of import will increase and that places heavy burden over balance of trade. Interestingly, the causative relation shows that export is not causing positive impact by currency devaluation for other south Asian countries except Pakistan.

IV. Recommendations

i. It is strongly recommended export should be made highly elastic by value addition. It can only be possible for significant Industrialization and capital accumulation.
ii. Industrialization growth accompanied with increase in tariff, duties on import or even anti-dumping where ever necessary would prove effective tool for discouraging the imports.
iii. Regional trade should be facilitated and regional cooperation should be encouraged for trade growth.

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