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### Impact of Indo-ASEAN Import on ASEAN Trade and Financial Integration

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## **Impact of Indo-ASEAN Import on ASEAN Trade and Financial Integration**

Debesh Bhowmik<sup>1</sup>

### **Abstract**

*In this paper, the author examined the influence of Indo-ASEAN import on the ASEAN trade and financial integration during 1994-95 to 2017-18 using cointegration test, vector error correction model and Wald Test taking foreign direct investment inflows, real effective exchange rate, openness, Indo-ASEAN import, intra import share, GDP growth rate of ASEAN, the import concentration and diversification index of ASEAN as variables. The paper concludes that there are four co-integrating equations. There are short run causalities from Indo-ASEAN import, intra import share and FDI inflows of ASEAN to growth rate of ASEAN. Long run causalities were found from ASEAN growth rate of GDP to intra import share of ASEAN, from Indo-ASEAN import to growth rate of ASEAN, from FDI inflows of ASEAN and GDP growth of ASEAN to intra-ASEAN import share, from Indo-ASEAN import to import diversification index of ASEAN respectively. Lastly, there are short run causalities from indo-ASEAN import and import concentration index of ASEAN to import diversification index of ASEAN respectively during 1994-2017.*

**Keywords:** cointegration, financial integration, indo-ASEAN import, long run causality, short run causality, trade integration, vector error correction model

**JEL Classifications:** C32, F14, F15, F21, F36

### **1. Introduction**

Trade integration and financial integration are the important issues which cover economic integration process where optimum currency area and free trade area in a single market with a single currency are accomplished. Financial openness is the necessary condition of

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financial integration where rapid liberalization of capital account occurs and where composition of financial linkages between developed and developing countries fundamentally changed the push factors during the process of globalization (Sinha & Pradhan, 2008). Brouwer (2005) argued that financial market integration is the process through which financial markets in an economy became more intimately integrated with other economies in the rest of the world in which capital inflows enhanced and there was tendency of equalization of financial asset prices. Liebscher, Christl, Mooslechner, and Ritzberger-Grunwald (2006) lucidly described the aspects of financial integration which are [i] monetary integration either through currency union or through dollarization, [ii] liberalization of capital account, [iii] taking financial services from foreign stock exchanges through listing of securities and [iv] regulatory convergence and harmonization.

According to Kose, Prasad, Rogoff, and Wei (2006) the composition of capital flows, portfolio equity, foreign direct investment inflows, and accumulation of international reserves are the key determinants of financial openness. In this situation, the asymmetric information problems such as moral hazards and adverse selection should be carefully handled for integration (Eichengreen & Musa, 1998). On the other hand, terms of trade, gains from trade, intra-trade shares of export and import are the key determinants of trade integration under liberalization. Ho (2009) explained that the formal international treaty should be enforced when financial market integration started to work. It refers to two distinct elements; [i] cooperative policy responses to financial disturbances and [ii] elimination of restrictions from cross-border financial operations. Both of which achieve full unification of regional financial markets.

More explicitly, the studies of Levine (1997), Rousseau (2002) and Jayaratne and Strahan (1996) recognized that there is positive linkage between economic growth and financial development which promotes investment and business through reallocating capital. India-ASEAN bilateral relationship celebrated 25 years and completed ASEAN-India Free Trade Agreement which may enhance trade integration. Indo- ASEAN financial integration is not matured enough due to numerous barriers. Foreign Direct

Investment inflows into ASEAN from India was 0.389 billion US\$ in 2005 which was 12.6% of ASEAN share. It was reached at the peak level of 12.521 billion US\$ in 2010 which was 30.9% of ASEAN share. Then the amount started to decline to 4.489 billion US\$ in 2012 and 4.348 billion US\$ in 2015 respectively (Association of South-East Asian Nations, 2017).

Moreover, FDI inflows into India from ASEAN between April 2000 to March 2018 was about 68.91 billion US\$ while FDI outflows from India to ASEAN countries during April 2007-March 2015 was 38.67 billion US\$ (Ministry of External Affairs, Government of India, 2018). So, towards a common market with a single currency in ASEAN within 2025 what will be the common currency for payments mechanism is a million dollar question. Thus, what will be the strategic role of India towards common currency is now unseen, yet, at present Indo-ASEAN mode of payment mechanism is US\$ with freely floating exchange rate system. If Regional Comprehensive Economic Partnership and Asian Monetary Fund will completely realize through the Chiang Mai Initiative, then Chinese Yuan will become the mode of payments mechanism in Asian countries where ASEAN common currency (whatever its form may be) will be the chief competitor against Yuan which will hamper the financial integration process in Asia as well as in ASEAN.

In this paper, the author endeavors to explore the impact of Indo-ASEAN import on the ASEAN trade and financial integration during the specific period from 1994-95 to 2017-18. The author emphasized basically on foreign direct investment inflows, real effective exchange rate, trade openness and growth rate to relate Indo-ASEAN import to exemplify the financial integration. Conversely, the author gave importance on intra import share, GDP growth rate of ASEAN which influenced the Indo-ASEAN import to verify trade integration. Moreover, the author attempted to show the predominance of Indo-ASEAN import on the import concentration and diversification index of ASEAN during the above mentioned period.

## 2. Literature Review

There are ample literatures on ASEAN economic integration but a very few researches were found on the Indo-ASEAN trade and financial integration since India is not a member state of ASEAN bloc. Some of the important recent studies related with this issue have been incorporated. ASEAN India Free Trade Agreement was signed in 2016. AFTA is linked to Common Effective Preferential Tariff (CEPT) which will tend to 0-5% for each member where it is zero to ASEAN-5. India's trade with ASEAN increased in many folds and it will reach to US\$ 280 billion by 2024-25 but import tariff reductions by India would widened trade deficit during post-FTA but it is assumed that the overlap membership between TPP and RCEP may affect Indo-ASEAN trade adversely (Mukherjee, 2016). Moreover, India might face negative consequences in agriculture, textiles and auto companies and electronics sectors and the ASEAN India FTA agreement would favour the ASEAN countries more. But the service sector may contribute more and the agreements are likely to boost trade especially in IT services (Bakshi & Tayal, 2015). Intra-ASEAN trade has catapulted successfully but declined marginally in 2016 and 2017.

The ASEAN-India Investment and Services Agreements came into force on first July, 2015 to promote economic integration. Intra-ASEAN FDI has stipulated steadily and FDI inflows into ASEAN have recovered its downturn. India's FDI inflows to ASEAN were increasing up to 2012 then it started to fall. But FDI inflows into India from ASEAN are steadily increasing. ASEAN is now market driven economic integration through trade and FDI. FTA in the form of RCEP will help six dialogue partners including India. TPP can leave non TPPASEAN members. In the long run, all ASEAN countries should join in the TPP. Then long term effects of trade and inward FDI may be hampered by the formation of larger FTA. In such circumstances, institutional quality, physical infrastructure and business climate should be improved by which ASEAN can continue to attract FDI and integrate with Asia (Kawai & Naknoi, 2015).

SWIFT Discussion paper (2017) explained that slow commercial and financial flows underlying trade transaction and slow modernization of financial market infrastructure hinder the process of financial integration in ASEAN. The target of Asian Economic Community within 2025 through the financial liberalization is hampered by the slow progress of payment mechanism through single currency in the single market of ASEAN. Jenor and Ruhani (2007) studied with econometric models that ASEAN stock market is integrated with global market and ASEAN countries are regionally integrated and showed the impact of financial crisis on integration where structural breaks are generated by Asian Financial Crisis.

Fakhr and Tayebi (2009) examined in East Asia-Pacific region during 1990-2005 using Probit and Tobit model and found that GDP has a positive effect on integrating financial markets while exchange rate and interest rate are ambiguous. ASEAN Integration Report (2015) verified that CEPT-AFTA, ATIGA, and AFTA facilitated ASEAN Trade Integration. ASEAN Investment Guarantee Agreement emphasized on intra-FDI flows, cross border M&A sales, free flow of capital, financial services liberalization within ASEAN. Capital Account liberalization and ASEAN Infrastructure Fund will surely accelerate the process of financial integration of ASEAN.

Kurlantzick (2012) explained that to achieve free trade area, ASEAN has proved itself to be leader of Asian integration and has been successfully cooperating with USA, China, Japan, Korea and India where East Asia is becoming a driver of free trade agreements which have been helping to facilitate Asian Economic Integration. Trade liberalization with India ASEAN FTA has succeeded intra-ASEAN trade integration process. Chiang Mai Initiative has progressed towards better liquidity provisions in Asian banks. By opening regimes of free trade area with non-ASEAN countries unveiled a new prospect of Trans-Pacific-Partnership.

Chandran (2011) explained Indo-ASEAN trade in sectors and commodities and mentioned that India's export intensity index with ASEAN increased from 0.9127 in 1990 to 1.8592 in 2005 and

then started to fall. India's import intensity index with ASEAN stepped up to 1.5770 in 1990 to 1.6801 in 2006 and then decreased. But the import intensity index is always greater than the export intensity index.

Sikdar and Nag (2011) verified that in the regime of India-ASEAN free trade agreement, India's welfare gain became negative although Indo-ASEAN bilateral trade has increased which implied to boost in GDP and much trade diversion occurred in India and ASEAN. If negative terms of trade are neutralized then Indo-ASEAN export might be boost up. Authors' simulation results revealed that the rest of the world experiences a significant market share loss in India and the ASEAN countries. The long term effect of free trade agreements in India will increase India's allocative efficiency after complete liberalization but terms of trade will deteriorate. Kumar, Sen, and Asher (2005) analyzed that India-ASEAN partnership could also be an important building block of the emerging broader regional economic co-operation in Asia viz. an Asian Economic Community through fruitful sharing in technology, capital including human capital and trade under WTO negotiations. Kumar (2004) incorporated ASEAN+3 with India under the process of Asian Economic Community with the introduction of Asian Currency Unit for future prospect of Pan Asian Economic Cooperation where India's role should be pivotal and pro-active in trade and financial integration. But Mukherjee (2012) explored the Chinese advantage over India in ASEAN trade and finance in the integration process.

Bhowmik (2015) has raised an issue that India-led ASEAN is not rosy prospect due to stumbling block of forming ASEAN+4 and emergence of Japan-USA and China-USA strategic relationships in increasing ASEAN trade and in establishing of an Asian Monetary Fund. Francis (2011) showed that ASEAN-India Free Trade Agreement would lead to an increase in ASEAN market access in India, produce negative effect on small scale industries in agriculture related products and import liberalization will help India's transport and machinery sector including MNC dominated chemicals and iron and steel sectors. It is to note that neglect of agriculture and service sector of manufactured base may hamper employment as a result of full trade liberalization.

In the study of Organization for Economic Co-operation and Development (2018) it was emphasized that India and China have been playing a great role in the structural policy in ASEAN in the areas of skill, education, foreign direct investment, infrastructure, connectivity, green finance, trade, land use and innovation to achieve development goals. In analyzing Indo-ASEAN integration, Das (2018) showed that India's share of ASEAN trade was only 0.5% in 2000 which increased to 2.5% in 2015. On the other hand, ASEAN's FDI inflows was about 40 million US\$ in 2005 which stepped up to 1600 million US\$ (about 1% share) in 2015 and there is scope for investment in service sector.

In Indo-ASEAN financial sector development, Export-Import Bank of India (2018) studied that foreign direct investment outflows from India to ASEAN was 70013.9 million US\$ from 1996 April to 2017 March which was equivalent to 22.9% of the share of ASEAN in India's total investment instead of 0.16% in 1996. Moreover, foreign direct investment inflows to India from ASEAN was 59650.34 million US\$ from 2000 April to 2017 June which was 17.4% share of ASEAN in India's total investment in comparison to 2% in 1996. India's FDI outflows to ASEAN comprises 26.2% in coal, oil and natural gas and 20.3% in metals. Similarly, India's FDI inflows from ASEAN comprise 27.9% in real estate and 18.8% in coal, oil and natural gas respectively. The potential areas constitute digital industry, financial services sector and physical infrastructure and the focus areas are multilateral connectivity, energy security, health care and tourism sector.

Geert, Fukuda, Mourmouras, and Zhou (2015) claimed that intra ASEAN trade has increased due to liberalization as well as equity and bond fund and cross border portfolio investment inflows to ASEAN have been rising because capital account liberalization was adopted in 2010 and ASEAN Banking Integration Framework was implemented by ASEAN Central Bank Governors in April 2011 to achieve ASEAN banking sector liberalization. Even, bilateral banking integration was emphasized. In addition to that ASEAN Capital market infrastructure blue print was developed in 2013 and FDI inflows are regarded as a desirable form of capital inflows. For next 10 years ASEAN set target of [i] A Two Track approach for banking integration and [ii] A Three-dimensional framework to



long term financial services. Although, ASEAN is fully aware and taken care of the Euro Crisis during the course of financial integration

### 3. Methodology and Data

This study assumes;

$x_1$  = Foreign Direct Investment inflows of ASEAN in million US\$

$x_3$  = Import concentration index of ASEAN

$x_4$  = Import diversification index of ASEAN

$x_5$  = Real Effective Exchange Rate of ASEAN in 36 country trade weighted

$x_6$  = GDP growth rate of ASEAN in %.

$x_7$  = Openness of ASEAN in %.

$y$  = Indo-ASEAN import in million US\$

$y_1$  = Intra-import share of ASEAN in % total

$y_2$  = Import concentration index of ASEAN

$y_3$  = Import diversification index of ASEAN

The data on  $x_1$  have been collected from World Investment Report (All years) during 1994-2017. The data on  $x_3$ ,  $x_4$ ,  $x_5$ ,  $x_6$ ,  $x_7$ ,  $y_1$ ,  $y_2$ ,  $y_3$  have been collected from the UNCTAD (UNO) from 1994 to 2017. Also, the data on  $y$  have been collected from DGCIS, Kolkata from 1994-95 to 2017-18. The ten countries were included in ASEAN-10.

The semi-log linear regression model is used to show the trend line. The double log multiple regression model helped to relate Indo-ASEAN import ( $y$ ), import concentration index ( $y_2$ ) and import diversification index ( $y_3$ ) of ASEAN. Bai and Perron (2003) model examines the structural breaks. Auto Regressive Integrated Moving Average (1,1,1) forecast model was applied to show future converging or diverging process of auto regression and moving average of the Indo-ASEAN import. Johansen (1988) model was used to show cointegration test and Vector Error Correction among all variables. The Wald (1943) test verified the short run causality among the variables.

### 4. Observations from Econometric Models (Part-1)

India's import from ASEAN has been increasing at the rate of 15.126% per year significantly during 1994-2017.

$$\log(y) = 9.377248 + 0.151266t \tag{1}$$

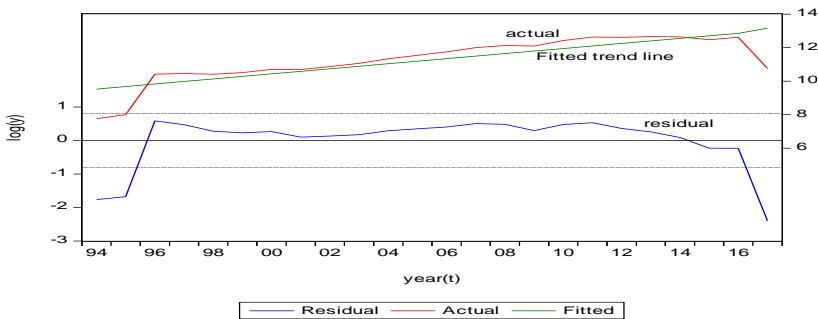
(27.77)\* (6.43)\*

$R^2=0.652, F=41.39*, DW=0.71$

Where  $y$  = India’s imports from ASEAN,  $t$  = year, \* significant at 5% level.

In Figure 1, the trend line of Indo-ASEAN import is plotted which is seen as steadily upward.

**Figure 1: Trend line of Indo-ASEAN imports**



Source: Plotted by author

Indo-ASEAN imports have showed two upward structural breaks in 1997 and 2007 which were obtained by Bai-Perron model on the assumptions of L+1 Vs L sequentially determined breaks selecting trimming 0.15 with maximum 5 breaks. The model used HAC standard errors and covariance with Bartlett kernel and Newey-West fixed bandwidth = 3.0. The least square estimated with breaks are stated below in the Table 1. All the structural breaks showed good fit.

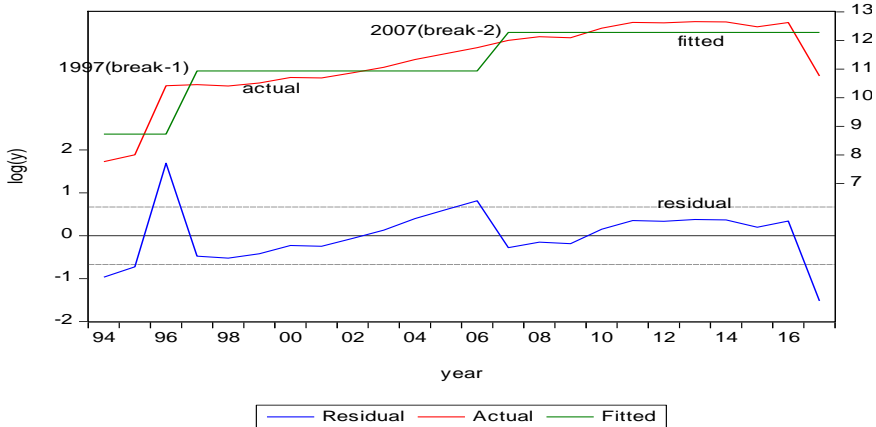
**Table 1: Structural Breaks**

Variable	Coefficient	Standard Error	t-Statistic	Probability
1994 - 1996 -- 3 obs.				
C	8.728	0.565	15.423	0.0000
1997 - 2006 -- 10 obs.				
C	10.933	0.224	48.646	0.000
2007 - 2017 -- 11 obs.				
C	12.278	0.178	68.775	0.000
$R^2=0.77$		$F=35.22*$		$DW=1.66$

Source: Calculated by author

In Figure 2, the structural breaks in 1997 and 2007 are shown clearly in the fitted line where both the breaks are upward.

**Figure 2: Structural Breaks**



Source: Plotted by author

The ARIMA (1,1,1) model of the  $\log(y)$  i.e. Indo-ASEAN import from 1994 to 2017 is estimated using conditional maximum likelihood method and its regression equation is given below.

$$\log(y_t) = 2.80503 + 0.765682\log(y_{t-1}) + \varepsilon_t - 0.35083\varepsilon_{t-1} \quad (2)$$

(3.08)\*      (9.28)\*      (-0.717)

AR root = 1.306, MA root = 2.85, SC = 47.28, AIC = 42.74,

Loglikelihood = -17.37, \* significant at 5% level.

Since the z value of the coefficient of  $\log y_{t-1}$  (i.e. AR) is significant at 5% level but the z value of the coefficient of  $\varepsilon_{t-1}$  (i.e. MA) is insignificant which implies that autoregressive method is converging but Moving Average method is diverging, so that the ARIMA model is non-stationary and unstable since the roots are greater than one. The predicted value of ARIMA in 2030 will be 11.956 which is increasing from  $10.7607 = \log y_t$  in 2017 which proves that ARIMA is moving away from equilibrium and is significant at 5% level. It is plotted in the Figure 3.

**Figure 3: The Forecast Value of ARIMA In 2030**



Source: Plotted by author

The long run association among Indo-ASEAN import, FDI inflows, intra-imports share, REER, GDP growth rate and openness of ASEAN during 1994-2017 have been worked out by Johansen unrestricted cointegration rank test for the first difference series in terms of log with linear deterministic trend in which 4 cointegrating equations in Trace Statistic and Max Eigen Statistic have been found out which are significant at 5% level.

**Table 2a: Johansen Cointegration Test**

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Probability* *
None *	0.966	211.035	95.754	0.000
At most 1 *	0.938	136.450	69.819	0.000
At most 2 *	0.830	75.314	47.856	0.000
At most 3 *	0.665	36.337	29.797	0.007
At most 4	0.345	12.308	15.495	0.143
At most 5	0.127	2.996	3.842	0.084

**Table 2b: Johansen Cointegration Test**

	Eigenvalue	Max Eigen Statistic	0.05 Critical Value	Probability**
None *	0.966	74.584	40.078	0.000
At most 1 *	0.938	61.136	33.877	0.000
At most 2 *	0.830	38.977	27.584	0.001
At most 3 *	0.665	24.029	21.131	0.020
At most 4	0.345	9.312	14.265	0.261
At most 5	0.127	2.996	3.841	0.084

\*Denotes rejection of the hypothesis at the 0.05 level, \*\*MacKinnon, Haug, & Michelis (1999) probability values

Source: Calculated by author

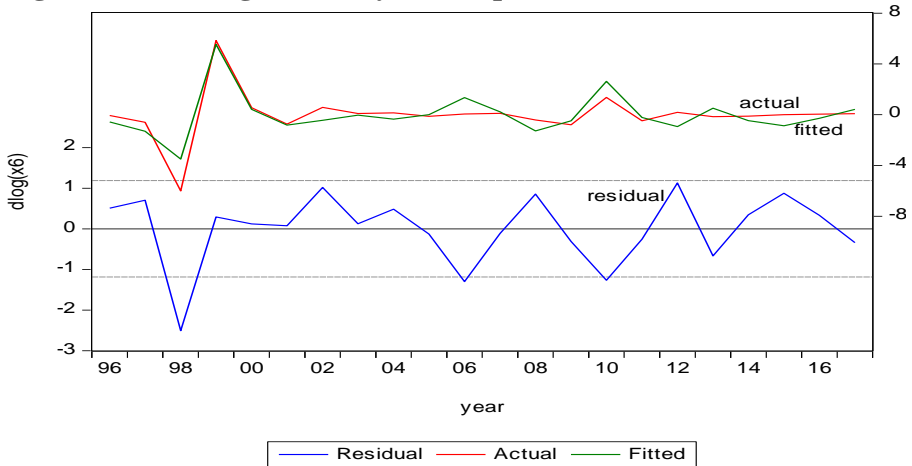
All the estimated equations of the VECM have been sorted out which are given in the Table 3.

The equation 1 is a good fit. The coefficients of  $EC_1$  and  $EC_2$  are significant and converging to equilibrium but the coefficients of  $EC_3$  and  $EC_4$  are significant but diverging away from equilibrium. All other coefficients of the variables are not significant at 5% level. The estimated equation 2 is a bad fit. All error correction terms are insignificant and other coefficients of the variables are insignificant. The equation 3 is not a good fit but only  $EC_4$  is significant and converging but all other coefficients of the variables are insignificant. The equation 4 is not a good fit. Coefficient of  $EC_2$  is significant but divergent. There is negative significant relation between  $\Delta \log x_{5t}$  and  $\Delta \log x_{7t-1}$ . All other coefficients are not significant. The equation 5 is a good fit. All the error correction terms are significant but only  $EC_1$  is converging towards equilibrium. There are positive significant relations between  $\Delta \log y_{t-1}$  and  $\Delta \log x_{6t}$ ,  $\Delta \log x_{1t-1}$  and  $\Delta \log x_{6t}$ , and  $\Delta \log x_{6t}$  and  $\Delta \log y_{1t-1}$ , and significant negative relations between  $\Delta \log x_{6t}$  and  $\Delta \log x_{5t-1}$ ,  $\Delta \log x_{6t}$  and  $\Delta \log x_{7t-1}$  respectively. The estimated VECM [5] is neatly plotted in Figure 4 where convergence is visible clearly.

**Table 3: Estimated VECM**

Var.	Coefficients of independent variables and their t values										
Eq. no.	Const.	EC <sub>1</sub>	EC <sub>2</sub>	EC <sub>3</sub>	EC <sub>4</sub>	$\Delta \log y_{t-1}$	$\Delta \log x_{t-1}$	$\Delta \log y_{t-1}$	$\Delta \log x_{t-1}$	$\Delta \log x_{t-1}$	$\Delta \log x_{t-1}$
[1]	0.135 (1.32)	-1.113 (-4.6)*	-0.273 (-2.8)*	9.513 (3.64)*	6.750 (2.1)*	-0.041 (-0.16)	0.457 (0.958)	-4.489 (-1.20)	1.858 (0.41)	-0.036 (-0.51)	0.321 (0.204)
[2]	0.138 (1.60)	-0.057 (-0.28)	0.030 (0.36)	0.067 (0.03)	-0.705 (-0.2)	-0.133 (-0.62)	0.496 (1.22)	-2.071 (-0.65)	-4.276 (-1.11)	0.015 (0.24)	-2.031 (-1.52)
	R <sup>2</sup> = 0.83, F = 5.37, AIC = 1.227, SC = 1.773, * significant at 5% level, EC = Error Correction										
[3]	0.019 (2.2)*	0.033 (1.61)	0.002 (0.20)	-0.400 (-1.87)	-0.709 (2.54)*	-0.039 (-1.82)	-0.061 (-1.49)	0.273 (0.85)	0.443 (1.15)	-0.002 (-0.33)	-0.026 (-0.19)
	R <sup>2</sup> = 0.61, F = 1.78, AIC = -3.69, SC = -3.15, * significant at 5% level										
[4]	0.008 (1.29)	0.011 (0.74)	0.013 (2.14)*	-0.242 (-1.50)	-0.326 (-1.5)	-0.015 (-0.94)	0.095 (3.10)*	-0.455 (-1.89)	-0.084 (-0.2)	-0.001 (-0.28)	-0.217 (-2.1)*
	R <sup>2</sup> = 0.58, F = 0.53, AIC = -4.26, SC = -3.71, * significant at 5% level										
[5]	-0.233 (-1.1)	-2.647 (-5.2)*	0.5957 (2.89)*	17.416 (3.27)*	34.820 (5.0)*	2.182 (4.08)*	2.633 (2.59)*	-16.171 (-2.0)*	-37.490 (-3.9)*	0.074 (0.49)	-8.799 (-2.6)*
	R <sup>2</sup> = 0.90, F = 10.18, AIC = 2.77, SC = 3.27, * significant at 5% level										
[6]	0.016 (1.50)	0.146 (5.68)*	0.011 (1.06)	-1.106 (-4.1)*	-2.249 (-6.3)*	-0.108 (3.94)*	0.037 (0.71)	0.877 (2.15)*	0.507 (1.03)	0.024 (3.18)*	0.094 (0.57)
	R <sup>2</sup> = 0.87, F = 7.44, AIC = -3.21, SC = -2.66, * significant at 5% level										

Source: Calculated by author

**Figure 4: Convergence of System Equation-5**

Source: Plotted by author

The equation 6 is a good fit where the coefficients of  $EC_1$ ,  $EC_3$  and  $EC_4$  are significant but only  $EC_3$  is moving towards equilibrium. There is significant negative relation between  $\Delta \log x_{7t}$  and  $\Delta \log y_{t-1}$ . On the other hand there is negative significant relation between  $\Delta \log x_{7t}$  and  $\Delta \log y_{1t-1}$ ,  $\Delta \log x_{7t}$  and  $\Delta \log x_{6t-1}$  respectively.

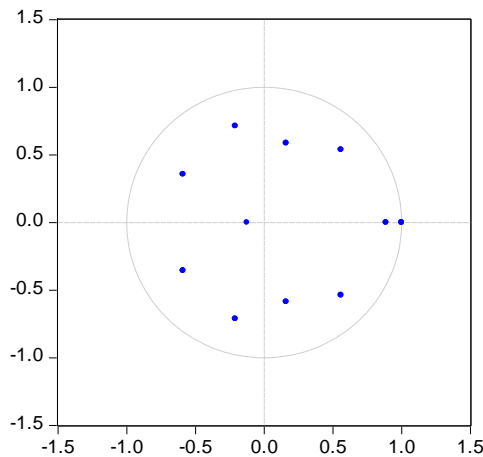
In the VECM, the inverse roots of AR characteristic polynomial are given in the Table 4, where there are two unit roots, one root is positive and less than one, one is negative root, and others are imaginary roots. All the roots lie on or inside the unit circle (Figure 5). Therefore the VECM is stable but non-stationary.

In the impulse response functions in Figure 6, the six figures in the first column proved that no short run causalities were found from all variables to  $\log y_t$  which were obtained from VECM system equation 1 and from the Wald test. Second column showed that there are no short run causalities from all variables to  $\log x_{1t}$  and is shown in VECM equation 2. The figures in the third column confirmed that no causalities were observed to  $\log y_{1t}$  which were found in VECM equation 3.

**Table 4: The Values of Roots**

Root	Modulus
1.000000	1.000
1.000000	1.000
0.886518	0.887
0.559429 - 0.537693i	0.776
0.559429 + 0.537693i	0.776
-0.210363 - 0.712164i	0.743
-0.210363 + 0.712164i	0.743
-0.589822 - 0.355990i	0.690
-0.589822 + 0.355990i	0.690
0.160199 - 0.587128i	0.609
0.160199 + 0.587128i	0.609
-0.125350	0.125

Source: Calculated by author

**Figure 5: Unit Circle**

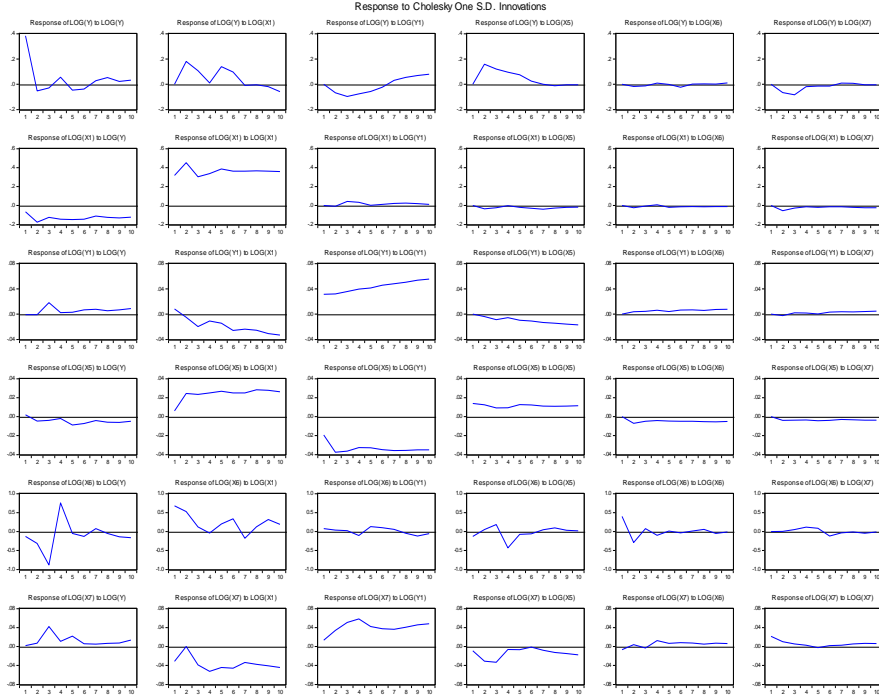
Source: Plotted by author

The figures in the second and fifth rows of the 4<sup>th</sup> column proved that short run causalities were observed from  $\log x_{1t-1}$  and  $\log x_{7t-1}$  to  $\log x_{5t}$  which were shown in VECM equation 4. The short run causalities from  $\log y_{t-1}$ ,  $\log x_{1t-1}$ ,  $\log y_{1t-1}$ ,  $\log x_{5t-1}$ ,  $\log y_{7t-1}$  to  $\log x_{6t}$  were shown in the figures of first, second, third, fourth and last rows of the 5<sup>th</sup> column and was found in the VECM equation 5. The short run causalities from  $\log y_{t-1}$ ,  $\log y_{1t-1}$  and  $\log x_{6t-1}$  to  $\log x_{7t}$  were shown



in figures of the 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> rows of 6<sup>th</sup> column and were verified in the VECM equation 6.

**Figure 6: Impulse Response Functions**



Source: Plotted by author

In the estimated system equation -1, the four cointegrating equations are given in Table 5.

The cointegrating equation one and two are converging towards equilibrium which imply that there are long run causalities running from  $\log y_{t-1}$ ,  $\log x_{6t-1}$ ,  $\log x_{7t-1}$  to  $\Delta \log y_t$  and from  $\log x_{1t}$ ,  $\log x_{6t-1}$ ,  $\log x_{7t-1}$  to  $\Delta \log y_t$ . All relationships are negative. Their speeds of adjustments are 111% and 27% per year respectively. On the contrary, cointegrating equations three and four have been diverging away from equilibrium and are significant.

The Wald Test suggests that no short run causalities were visible from  $\Delta \log x_{1t-1}$ ,  $\Delta \log x_{5t-1}$ ,  $\Delta \log x_{6t-1}$ ,  $\Delta \log x_{7t-1}$ ,  $\Delta \log y_{1t-1}$  to  $\Delta \log y_t$  whose  $\chi^2(1)$  values are insignificant.

**Table 5: Cointegrating Equations (1)**

Variables, coefficients and t values,*significant at 5% levels				
1] $Z_{1t-1}$	$\log y_{t-1}$	$\log x_{6t-1}$	$\log x_{7t-1}$	constant
	-1.113 (-4.68)*	-0.068 (-0.245)	-3.236 (-8.09)*	2.414
2] $Z_{2t-1}$	$\log x_{1t-1}$	$\log x_{6t-1}$	$\log x_{7t-1}$	constant
	-0.273 (-2.81)*	-2.448 (-8.65)*	-1.722 (-1.09)	-0.089
3] $Z_{3t-1}$	$\log y_{1t-1}$	$\log x_{6t-1}$	$\log x_{7t-1}$	constant
	9.138 (3.64)*	-0.12201 (-3.25)*	-1.3419 (-6.46)*	+2.746
4] $Z_{4t-1}$	$\log x_{5t-1}$	$\log x_{6t-1}$	$\log x_{7t-1}$	constant
	6.751 (2.06)*	0.046 (3.82)*	0.713 (10.62)*	-7.811

Source: Calculated by author

In the system equation 2, the estimated four cointegrating equations in Table 6.

**Table 6: Cointegrating Equations (2)**

Variables, coefficients and t values,* significant at 5% level				
1] $Z_{1t-1}$	$\log y_{t-1}$	$\log x_{6t-1}$	$\log x_{7t-1}$	constant
	-0.0567 (-0.282)	-0.068 (-0.245)	-3.236 (-8.09)*	2.414
2] $Z_{2t-1}$	$\log x_{1t-1}$	$\log x_{6t-1}$	$\log x_{7t-1}$	constant
	0.030 (0.366)	-2.448 (-8.65)*	-1.722 (-1.09)	-0.089
3] $Z_{3t-1}$	$\log y_{1t-1}$	$\log x_{6t-1}$	$\log x_{7t-1}$	constant
	0.067 (0.031)	-0.122 (-3.25)*	-1.342 (-6.46)*	2.746
4] $Z_{4t-1}$	$\log x_{5t-1}$	$\log x_{6t-1}$	$\log x_{7t-1}$	constant
	-0.705 (-0.254)	0.046 (3.82)*	0.713 (10.62)*	-7.811

Source: Calculated by author

All these cointegrating equations have not been converging towards equilibrium so that there are no long run causalities from  $\log y_{t-1}$ ,  $\log x_{6t-1}$ ,  $\log x_{7t-1}$ ,  $\log x_{1t-1}$  to  $\Delta \log x_{1t}$ . The equations one and four have been approaching to equilibrium insignificantly and the equations two and three have been diverging insignificantly.

According to the Wald test, there are no short run causalities from  $\Delta \log y_{t-1}$ ,  $\Delta \log y_{1t-1}$ ,  $\Delta \log x_{5t-1}$ ,  $\Delta \log x_{6t-1}$ ,  $\Delta \log x_{7t-1}$  to  $\Delta \log x_{1t}$  where  $\chi^2(1)$  values are insignificant. In the system equation 3, the estimated four cointegrating equations have been found in Table 7.

**Table 7: Cointegrating Equations (3)**

Variables, coefficients and t values, significant at 5% level.				
1] $Z_{1t-1}$	$\log y_{t-1}$ 0.033 (1.619)	$\log x_{6t-1}$ -0.068 (-0.245)	$\log x_{7t-1}$ -3.236 (-8.09)*	constant 2.414
2] $Z_{2t-1}$	$\log x_{1t-1}$ 0.002 (0.203)	$\log x_{6t-1}$ -2.448 (-8.65)*	$\log x_{7t-1}$ -1.722 (-1.09)	constant -0.089
3] $Z_{3t-1}$	$\log y_{1t-1}$ -0.400 (-1.87)	$\log x_{6t-1}$ -0.122 (-3.25)*	$\log x_{7t-1}$ -1.342 (-6.46)*	constant 2.746
4] $Z_{4t-1}$	$\log x_{5t-1}$ -0.709 (-2.54)*	$\log x_{6t-1}$ 0.046 (3.82)*	$\log x_{7t-1}$ 0.713 (10.62)*	constant -7.811

Source: Calculated by author

The cointegrating equations 1-3 proved that there are no long run causalities from  $\log y_{t-1}$ ,  $\log x_{1t-1}$ ,  $\log x_{6t-1}$ ,  $\log x_{7t-1}$  to  $\Delta \log y_{1t}$ . But the cointegration equation 4 is tending towards equilibrium so that there are long run causalities from  $\log x_{5t-1}$ ,  $\log x_{6t-1}$ ,  $\log x_{7t-1}$  to  $\Delta \log y_{1t}$ . Its speed of adjustment is 70% per year. The relationships are positive.

The Wald test confirmed that there are no short run causalities running from  $\Delta \log y_{t-1}$ ,  $\Delta \log x_{1t-1}$ ,  $\Delta \log x_{5t-1}$ ,  $\Delta \log x_{6t-1}$ ,  $\Delta \log x_{7t-1}$  to  $\Delta \log y_{1t}$ . Their  $\chi^2(1)$  values are found insignificant.

From the system equation 4, it was found four cointegrating equations which are given in Table 8.

Among all the cointegrating equations, the equation 1 is diverging insignificantly and the equations 2-4 are converging insignificantly so that there are no long run causalities from  $\log y_{t-1}$ ,  $\log x_{6t-1}$ ,  $\log x_{7t-1}$ ,  $\log x_{1t-1}$  to  $\Delta \log x_{5t}$ .

According to the Wald test there are short run causalities running from  $\Delta \log x_{1t-1}$ ,  $\Delta \log x_{7t-1}$  to  $\Delta \log x_{5t}$  where  $\chi^2(1)$  values are significant. In other words, FDI inflows of ASEAN positively affected REER of ASEAN and the openness and negatively affected

REER of ASEAN in the short run. But there are no short run causalities from other variables. The relationships are positive for  $\Delta \log x_{1t-1}$  and negative for  $\Delta \log x_{7t-1}$ .

In the system equation 5, there are four estimated cointegrating equations which are shown below in Table 10.

**Table 8: Cointegrating Equations (4)**

Variables, coefficients and t values,* significant at 5% level				
1] $Z_{1t-1}$	$\log y_{t-1}$ 0.011 (0.748)	$\log x_{6t-1}$ -0.068 (-0.245)	$\log x_{7t-1}$ -3.236 (-8.09)*	constant 2.414
2] $Z_{2t-1}$	$\log x_{1t-1}$ -0.013 (-0.146)	$\log x_{6t-1}$ -2.448 (-8.65)*	$\log x_{7t-1}$ -1.722 (-1.09)	constant -0.089
3] $Z_{3t-1}$	$\log y_{1t-1}$ -0.242 (-1.506)	$\log x_{6t-1}$ -0.122 (-3.25)*	$\log x_{7t-1}$ -1.342 (-6.46)*	constant 2.746
4] $Z_{4t-1}$	$\log s_{t-1}$ -0.325 (-1.55)	$\log x_{6t-1}$ 0.046 (3.82)*	$\log x_{7t-1}$ 0.713 (10.62)*	constant -7.811

Source: Calculated by author

**Table 9: Short Run Causality to  $\Delta \log x_{5t}$**

Ho=null hypothesis of no causality	$\chi^2(1)$	Probability	Ho rejected/accepted
C(39)=0	9.655	0.002	Rejected
C(43)=0	4.631	0.031	Rejected

Source: Calculated by author

**Table 10: Cointegrating Equations (5)**

Variables, coefficients and t values,*=significant at 5% level				
1] $Z_{1t-1}$	$\log y_{t-1}$ -2.647 (-5.25)*	$\log x_{6t-1}$ -0.068 (-0.245)	$\log x_{7t-1}$ -3.236 (-8.09)*	constant 2.414
2] $Z_{2t-1}$	$\log x_{1t-1}$ 0.596 (2.892)*	$\log x_{6t-1}$ -2.448 (-8.65)*	$\log x_{7t-1}$ -1.722 (-1.09)	constant -0.089
3] $Z_{3t-1}$	$\log y_{1t-1}$ 17.416 (3.77)*	$\log x_{6t-1}$ -0.122 (-3.25)*	$\log x_{7t-1}$ -1.342 (-6.46)*	constant 2.746
4] $Z_{4t-1}$	$\log s_{t-1}$ 34.823 (5.015)*	$\log x_{6t-1}$ 0.046 (3.82)*	$\log x_{7t-1}$ 0.713 (10.62)*	constant -7.811

Source: Calculated by author

The cointegrating equations 2-4 are diverging significantly whereas equation 1 is converging significantly towards equilibrium whose speed of adjustment is 264% per year. So, there are long run causalities from  $\log x_{5t-1}$ ,  $\log x_{6t-1}$  and  $\log x_{7t-1}$  to  $\Delta \log x_{6t}$ . The relationships are negative. In other words, REER and openness of ASEAN negatively influenced the GDP growth rate of ASEAN in the long run.

The Wald test confirmed that there are short run causalities from  $\Delta \log y_{t-1}$ ,  $\Delta \log x_{1t-1}$ ,  $\Delta \log y_{1t-1}$ ,  $\Delta \log x_{5t-1}$ ,  $\Delta \log x_{7t-1}$  to  $\Delta \log x_{6t}$  whose  $\chi^2(1)$  values showed significant. The relationships are positive but for  $\Delta \log x_{5t-1}$  and  $\Delta \log x_{7t-1}$  are negative. Conversely, there are short run causalities running from Indo-ASEAN import, FDI inflows, intra-import share, REER, and openness of ASEAN to GDP growth rate of ASEAN during 1994-2017 (Table 11).

**Table 11: Short Run Causality to  $\Delta \log x_{6t}$**

Ho=null hypothesis of no causality	$\chi^2(1)$	Probability	Ho rejected/accepted
C(49)=0	16.707	0.000	Rejected
C(50)=0	6.7538	0.009	Rejected
C(51)=0	4.162	0.041	Rejected
C(52)=0	15.277	0.000	Rejected
C(54)=0	6.971	0.008	Rejected

Source: Calculated by author

Lastly in the system equation 6, the four cointegrating estimated equations are given in Table 12.

Equation 1 is diverging significantly but the equation 3 and 4 have been approaching to equilibrium significantly which imply that there are long run causalities from  $\log y_{1t-1}$ ,  $\log x_{5t-1}$ ,  $\log x_{6t-1}$  and  $\log x_{7t-1}$  to  $\Delta \log x_{7t}$ . In other words, there are long run causalities from intra-import share, REER, GDP growth rate of ASEAN to openness of ASEAN during 1994-2017. Their speeds of adjustments are 110% and 224% per year respectively. In the equation 3, the relationships are negative and in the equation 4, the relationships are positive except for  $\log x_{5t-1}$ .

The Wald test verified that there are short run causalities from  $\Delta \log y_{t-1}$ ,  $\Delta \log y_{1t-1}$ ,  $\Delta \log x_{6t-1}$ , to  $\Delta \log x_{7t}$  whose  $\chi^2(1)$  values showed significant and other variables have no short run causalities.

The relationships are positive except for  $\Delta \log y_{t-1}$ . Or, in other words, there are short run causalities from intra-ASEAN import, intra-import share, GDP growth rate of ASEAN to openness of ASEAN (Table 13).

**Table12: Cointegrating Equations (6)**

Variables, coefficients and t values,* significant at 5% level				
1) $Z_{1t-1}$	$\log y_{t-1}$ 0.147 (5.68)*	$\log x_{6t-1}$ -0.068 (-0.245)	$\log x_{7t-1}$ -3.236 (-8.09)*	constant 2.414
2) $Z_{2t-1}$	$\log x_{1t-1}$ 0.011 (1.06)	$\log x_{6t-1}$ -2.448 (-8.65)*	$\log x_{7t-1}$ -1.722 (-1.09)	constant -0.089
3) $Z_{3t-1}$	$\log y_{1t-1}$ -1.107 (-4.06)*	$\log x_{6t-1}$ -0.122 (-3.25)*	$\log x_{7t-1}$ -1.342 (-6.46)*	constant 2.746
4) $Z_{4t-1}$	$\log x_{5t-1}$ -2.241 (-6.324)*	$\log x_{6t-1}$ 0.0462 (3.82)*	$\log x_{7t-1}$ 0.713 (10.62)*	constant -7.811

Source: Calculated by author

**Table 13: Short Run Causality to  $\Delta \log X_{7t}$**

Ho=null hypothesis of no causality	$\chi^2(1)$	Probability	Ho rejected/accepted
C(60)=0	15.602	0.000	Rejected
C(62)=0	4.66	0.031	Rejected
C(63)=0	10.14	0.002	Rejected

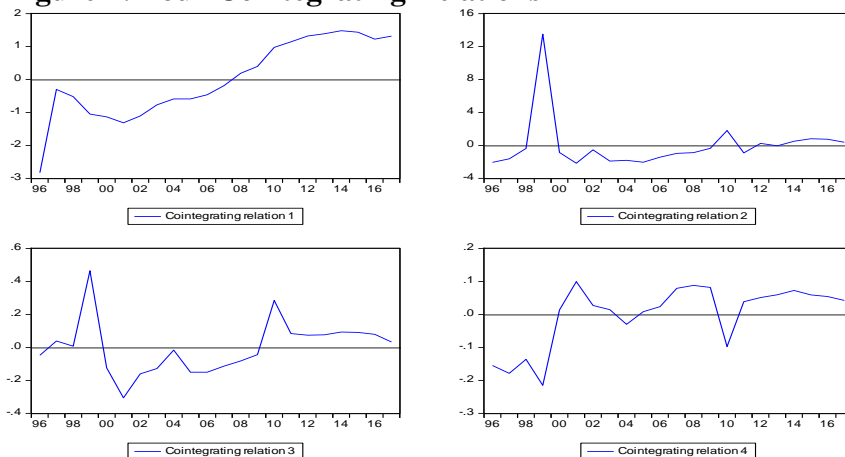
Source: Calculated by author

In the Figure 7, four cointegrating equations have been depicted neatly where the equation 2 and the equation 3 have been approaching towards equilibrium significantly. Others are diverging.

Thus, in short, there are short run causalities running from Indo-ASEAN import and intra import share to GDP growth rate of ASEAN. Both of the causalities elevated to trade integration in ASEAN. Moreover, there is short run causality from FDI inflows of ASEAN to growth rate of ASEAN which is the determinant of financial integration in ASEAN. Thus influences of short run

causality from Indo-ASEAN import to ASEAN trade and financial integration are meagre.

**Figure 7: Four Cointegrating Relations**



Source: Plotted by author

Similarly, there is long run causality from ASEAN growth rate of GDP to intra import share of ASEAN and there is long run causality from indo-ASEAN import to growth rate of ASEAN, both of which facilitate trade integration in ASEAN. Moreover, there are long run causalities from FDI inflows of ASEAN and GDP growth of ASEAN to intra ASEAN import share both of which corroborate to financial integration in ASEAN. Thus, the direct long run impacts of indo-ASEAN import to trade and financial integration in ASEAN are not high enough.

## 5. Observations from Econometric Models (Part-2)

The estimated multiple regression model among Indo-ASEAN import( $y_1$ ), import concentration index ( $y_2$ ) and import diversification index ( $y_3$ ) of ASEAN is given below.

$$\log(y_1) = 7.508383 + 7.739328\log(y_2) - 14.47214\log(y_3)$$

$$(3.008)^* \quad (5.128)^* \quad (-5.608)^* \quad (3)$$

$R^2 = 0.62$ ,  $F = 17.13^*$ ,  $DW = 1.161$ , \* significant at 5% level.

The multiple double log regression model is a good fit where the association between Indo-ASEAN import and import concentration index of ASEAN is positive and the association

between Indo-ASEAN import and import diversification index of ASEAN is negative. Both are significant at 5% level. Here  $R^2$  is high, F is significant and DW is greater than one (no serial correlation exists).

Johansen unrestricted cointegration rank test with linear deterministic trend of the first difference series proved that there are two cointegrating equations among Indo-ASEAN import ( $\log y$ ), import concentration index ( $\log y_2$ ), and import diversification index ( $\log y_3$ ) of ASEAN during 1994-2017 which were found from Trace Statistic and Max-Eigen Statistic. Therefore, cointegration test confirmed long run associations among Indo-ASEAN import, import concentration and diversification index of ASEAN (Table 14).

**Table 14: Johansen Cointegration Test**

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Probability**
None *	0.716	43.592	29.797	0.001
At most 1 *	0.465	15.884	15.495	0.044
At most 2	0.091	2.108	3.842	0.147
	Eigenvalue	Max- Eigen Statistic	0.05 Critical Value	Probability**
None *	0.716	27.708	21.132	0.005
At most 1	0.465	13.776	14.265	0.051
At most 2	0.091	2.108	3.841	0.147

\*Denotes rejection of the hypothesis at the 0.05 level, \*\*MacKinnon-Haug-Michelis (1999) p-values. Source: Calculated by author

Since the above variables are cointegrated then the estimates of vector error correction model are shown below in Table 15.

The estimated equation 1 is not a good fit because of low  $R^2$  and insignificant F and even no coefficients are found significant at 5% level. Both  $EC_1$  and  $EC_2$  are diverging. Also, the estimated equation 2 is not a good fit where all coefficients are not found significant at 5% level although  $R^2$  is high.  $EC_1$  is diverging and  $EC_2$  is converging. The equation 3 is a good fit since its  $R^2$  is high and F is significant. Coefficients of  $EC_1$ ,  $\Delta \log y_{t-2}$  and  $\Delta \log y_{2t-2}$  are significant at 5% level.  $EC_1$  is converging towards equilibrium



because its coefficient is negative and significant. But  $EC_2$  is diverging.

**Table 15: Vector Error Correction Model**

Var	Coefficients of independent variables and their t values								
Eq. no.	Const.	EC <sub>1</sub>	EC <sub>2</sub>	$\Delta \log y_{t-1}$	$\Delta \log y_{t-2}$	$\Delta \log y_{2t-1}$	$\Delta \log y_{2t-2}$	$\Delta \log y_{3t-1}$	$\Delta \log y_{3t-2}$
[1]	-0.127	0.302	3.429	0.439	0.324	-1.598	2.315	5.391	1.899
$\Delta \log y_t$	(-0.99)	(0.83)	(1.49)	(1.06)	(1.34)	(-0.86)	(1.55)	(1.35)	(0.59)
$R^2 = 0.44, F = 1.218, AIC = 1.44, SC = 1.89, EC = \text{Error Correction}$									
[2]	-0.006	0.025	-0.75	-0.03	0.319	0.195	0.300	-0.22	-0.244
$\Delta \log y_{2t}$	(-0.29)	(0.45)	(-2.02)	(-0.81)	(0.86)	(0.68)	(1.31)	(-0.36)	(-0.49)
$R^2 = 0.636, F = 2.62, AIC = -2.29, SC = -1.84$									
[3]	-0.008	-0.11	0.150	-0.02	0.037	-0.07	-0.19	-0.01	0.0324
$\Delta \log y_{3t}$	(-1.28)	(-6.12)*	(1.37)	(-2.01)	(3.29)*	(-0.77)	(-2.72)*	(-0.07)	(0.211)
$R^2 = 0.88, F = 11.74*, AIC = -4.63, SC = -4.18, *$ significant at 5% level.									

Source: Calculated by author

From the system equation 1 of the VECM, the two cointegrating equations are as follows:

**Table 16: Cointegrating Equations (7)**

$Z_{t-1}$	$\log y_{t-1}$	$\log y_{3t-1}$	constant
[i] $Z_{1t-1}$	0.302 (0.83)	7.374 (12.02)*	-2.004
[ii] $Z_{2t-1}$	$\log y_{2t-1}$ 3.429 (1.49)	$\log y_{3t-1}$ -1.112 (-5.98)*	constant 0.482

Source: Calculated by author, \*significant at 5% level

Thus, no long run causalities were found from  $\log y_{t-1}$ ,  $\log y_{2t-1}$  and  $\log y_{3t-1}$  to  $\Delta \log y_t$  since cointegrating equations have been diverging away from equilibrium because the coefficients of  $\log y_{t-1}$  and  $\log y_{2t-1}$  are positive and insignificant. Even the Wald test assured that no short run causalities were visible from  $\log y_{t-1}$ ,  $\log y_{2t-1}$  and  $\log y_{3t-1}$  to  $\Delta \log y_t$ .

From the system equation 2 of the VECM, it was found two cointegrating equations given in Table 17.

**Table 17: Cointegrating Equations (8)**

$Z_{t-1}$	$\log y_{t-1}$	$\log y_{3t-1}$	Constant
[i] $Z_{1t-1}$	0.025 (0.451)	7.374 (12.02)*	-2.004
[ii] $Z_{2t-1}$	$\log y_{2t-1}$	$\log y_{3t-1}$	Constant
	-0.715 (-2.027)	-1.112 (-5.98)*	0.482

Source: Calculated by author, \* significant at 5% level

The equation [i] is diverging and the equation [ii] is converging insignificantly, therefore, there are no long run causalities running from  $\log y_{t-1}$ ,  $\log y_{2t-1}$  and  $\log y_{3t-1}$  to  $\Delta \log y_{2t}$ . Even the Wald test verified that there are no short run causalities running from  $\log y_{t-1}$ ,  $\log y_{2t-1}$  and  $\log y_{3t-1}$  to  $\Delta \log y_{2t}$ . The system equation 3 of the VECM showed the following two cointegrating equations which are arranged in Table 18.

**Table 18: Cointegrating Equations (9)**

$Z_{t-1}$	$\log y_{t-1}$	$\log y_{3t-1}$	constant
[i] $Z_{1t-1}$	-0.106 (-6.12)*	7.374 (12.02)*	-2.004
[ii] $Z_{2t-1}$	$\log y_{2t-1}$	$\log y_{3t-1}$	constant
	0.150 (1.37)	-1.112 (-5.98)*	0.482

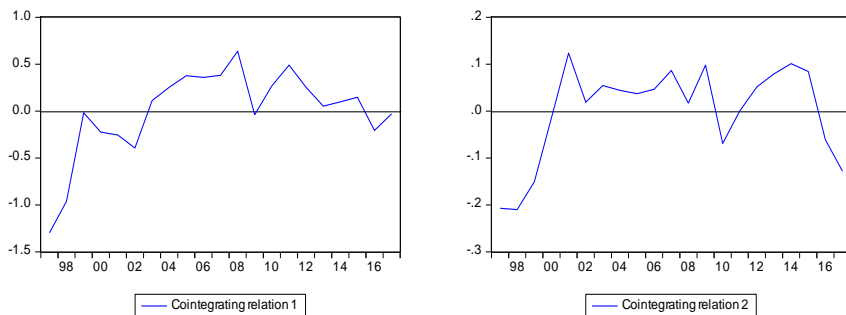
Source: Calculated by author, \* significant at 5% level

The cointegrating equation [i] is moving towards equilibrium significantly and therefore it is true that there are long run causalities from  $\log y_{t-1}$  and  $\log y_{3t-1}$  to  $\Delta \log y_{3t}$ . In other words, there is long run causality running from indo-ASEAN import to import diversification index of ASEAN during 1994-2017. The relationships are negative in the former and positive in the latter case.

Obversely, there are no long run causalities from  $\log y_{2t-1}$  and  $\log y_{3t-1}$  to  $\Delta \log y_{3t}$  because cointegrating equation [ii] is not proceeding towards equilibrium significantly. The Wald test verified that there are short run causalities from  $\log y_{t-2}$  and  $\log y_{2t-2}$  to  $\Delta \log y_{3t}$ , or, there are short run causalities from Indo-ASEAN import and import concentration index of ASEAN to import diversification index of ASEAN during 1994-2017. The former relationship is positive and latter is negative.

The two cointegrating equations have been depicted in Figure 8 where the equation 1 is converging towards equilibrium and the equation 2 is diverging.

**Figure 8: Cointegrating Relations**



Source: Plotted by author

Thus, concisely, there is long run causality running from Indo-ASEAN import to import diversification index of ASEAN and there are short run causalities from Indo-ASEAN import and import concentration index of ASEAN to import diversification index of ASEAN during 1994-2017, i.e. both of which piloted to facilitate import diversification index of ASEAN that might fructify trade integration of the bloc.

## 6. The Forthcoming Policies

So far as the model is concerned, the increase in import concentration and export diversification indices of ASEAN may lead to higher trade integration between India and ASEAN. To increase higher trade shares between India and ASEAN, the declining REER and inflation rate should be major role irrespective of reduction of tariffs and removal of other trade barriers. Foreign direct investment especially in infrastructure development and service sector might be important factor to boost financial sector development. ASEAN should have greater emphasis on the higher rate of GDP growth and intra-trade shares of the bloc itself. Even openness index should be hiked for all member states very soon.

The road map for free flow investment opportunities, capital flows, capital account convertibility and exchange rate management for single currency between India and ASEAN are important issues

which can accelerate the process of financial integration. On the other hand, implementation of tariff and non-tariff barriers to execute free trade agreement between India and ASEAN on goods and services are significantly urgent. Programme of infrastructure development fund and trade relation with non-member countries of ASEAN should be executed in the anticipated period. Indo-ASEAN target to realize the Chiang –Mai-Initiative is an important venture to speed up Asian Economic Integration process.

## **7. Conclusion**

The paper concludes that Indo-ASEAN import has been stepping up at the rate of 15.126% per year significantly during 1994-2017 where two upward structural breaks had been sorted out in 1997 and 2007. Forecast of ARIMA (1,1,I) for 2030 is non-stationary. There are four co-integrating equations among Indo-ASEAN import, FDI inflows, intra-imports share, REER, GDP growth rate and openness of ASEAN during 1994-2017. The VECM is stable but non-stationary.

The paper showed short run causalities from Indo-ASEAN import and intra import share to GDP growth rate of ASEAN. Both of the causalities led to trade integration in ASEAN. Moreover, there is short run causality from FDI inflows of ASEAN to growth rate of ASEAN which can accelerate financial integration in ASEAN. Similarly, there is long run causality from ASEAN growth rate of GDP to intra import share of ASEAN and there is long run causality from indo-ASEAN import to growth rate of ASEAN both of which facilitate trade integration in ASEAN. Moreover, long run causalities were found from FDI inflows of ASEAN and GDP growth of ASEAN to intra-ASEAN import share both of which led to financial integration in ASEAN. It is obvious that long run causality was visible from Indo-ASEAN import to import diversification index of ASEAN and these are crystal clear that short run causalities were found from Indo-ASEAN import and import concentration index of ASEAN to import diversification index of ASEAN during 1994-2017.

The paper cannot ignore certain limitations. The paper excludes the other factors of trade integration like terms of trade, gains from trade, intra-export share and so on. Similarly, the paper

does not include the factors of financial integration like equity shares, international reserves, long term bond yield and other capital flows. All the factors can link with Indo-ASEAN export and import during longer period that can yield good outcome of economic integration in ASEAN. All these research- works deserve subtle clarifications in the offering.

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## **Appendix**

ASEAN-Association of South East Asian Nations (Brunei, Indonesia, Lao PDR, Malaysia, Philippines, Singapore, Thailand, Vietnam, Cambodia and Myanmar)

FDI-Foreign Direct Investment

GDP-Gross Domestic Product

ASSOCHAM-Associated Chamber of Commerce and Industry of India

AFTA-ASEAN Free Trade Agreement

AIFTA-ASEAN India Free Trade Agreement

FTA-Free Trade Agreement

CEPT-Common Effective Preferential Tariff

ATIGA-ASEAN Trade in Goods Agreement

WTO-World Trade Organisation

MNC-Multi National Corporation

OECD-Organisation of Economic Cooperation and Development

ARIMA-Auto Regressive Integrated Moving Average

VECM-Vector Error Correction Model

EC-Error Correction

AIC-Akaika Information Criterion

SC-Schwarz Criterion

REER-Real Effective Exchange Rate

DW-Durbin Watson

CE-Cointegrating Equation

RCEP-Regional Comprehensive Economic Partnership

TPP-Trans-Pacific Partnership

**Formulas of Concentration and Diversification Index**

(Values of indices vary from 0 to 1)

Herfinahl-Hirschmann index

$$\text{Export Concentration Index} = \frac{\sqrt{\sum_{i=1}^N \left(\frac{x_{ij}}{x_j}\right)^2} - \sqrt{\frac{1}{N}}}{1 - \sqrt{\frac{1}{N}}}$$

where  $x_{ij}$  is the value of export of product  $i$  by country  $j$ ,  
 $x_j$  is the total value of exports of country  $j$  and  $N$ =number of products exported at 3 digit of the SITC revision 3

$$\text{Similarly, import concentration index} = \frac{\sqrt{\sum_{i=1}^N \left(\frac{M_{ij}}{M_j}\right)^2} - \sqrt{\frac{1}{N}}}{1 - \sqrt{\frac{1}{N}}}$$

where  $M_{ij}$  is the value of import of product  $i$  by country  $j$ ,  
 $M_j$  is the total value of imports of country  $j$  and  $N$ =number of products imported at 3 digit of the SITC revision 3

Export Diversification Index =  $(1 - H_j) \times 100$

$$\text{where } H_j = \sum_{i=1}^n \left[ \frac{x_{j,i}}{x_j} \right]^2$$

$x_{j,i}$  is the country's export for product  $i$  and  $x_j$  is total export of country  $j$  and  $n$ =total no.of products at 3 digit of the SITC revision 3.

Similarly, Import Diversification Index =  $(1 - IH_j) \times 100$

$$\text{where } IH_j = \sum_{i=1}^n \left[ \frac{M_{j,i}}{M_j} \right]^2$$

$M_{j,i}$  is the country's import for product  $i$  and  $M_j$  is total import of country  $j$  and  $n$ =total no.of products at 3 digit of the SITC revision 3.

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