Empirical Study on the Prospects of Asean's Trade and A Single Currency

Debesh Bhowmik

*(Retired Principal and Associated with Indian Economic Association and
The Indian Econometric Society, Life member, Bengal Economic Association,
Economic Association of Bihar and Uttar Pradesh)*
E-mail: debeshbhowmik@rediffmail.com; debeshbhowmik269@gmail.com

Abstract: The paper seeks to explain the nature and prospects of trade and monetary integration in ASEAN during 1990-2017.Growth,structural breaks of Intra export and intra import shares of ASEAN including external trade were shown and influencing factors like GDP, FDI, REER,openness and inflation were regressed with them. Short run and long run causalities were observed among the said variables through cointegration and vector error correction models.Monetary integration was explained through capital market development especially in share and bond markets and in currency convertibility. Optimum currency area criterion was tested through Beta and Sigma convergence hypothesis which proved that the adoption of single currency in ASEAN is now not feasible.

I. Introduction

International trade theory has shifted paradigmatically towards some new dimensions where regional or sub-regional trades have played a pivotal role which is being clarified by economic integration through trade, monetary and financial integration. Such successful international trading blocs are: Euro Area, ASEAN, SAARC, GCC, NAFTA, MERCASUR, BRICS, SACU, ECOWAS, and so on. They are based on five successive stages of economic integration i.e.Free Trade Area (FTA), Customs Union (CU), Common Market (CM), Economic Union (EU), and Complete Economic Integration (CEI) (Balassa, 1961). Viner (1950) stated that the achievement of RTAs (Regional Trade Agreements) and regional economic integration, to some extent, have brought positive as well as negative implications that might appear in the form of trade creation and trade diversion for the non-members countries.

Author of "Essays on International Money", "Asian Economic Integration","Euro Crisis and International Liquidity Problems", "International Monetary System:Past,Present and Future", "India and her Ancient International trade", "Econometric Applications", "Applications of Econometrics in Economics", "Developmental Issues of Tribes", "Economics of Poverty"

Success of monetary and financial integration are related with the feasibility of optimum currency area criteria which were developed by Mundell (1961), McKinnon(1963), Kenen(1969) and by many others.According to Mundell (1961), an optimum currency area is an economic unit composed of regions affected symmetrically by disturbances and between which labour and other factors of production flow freely. McKinnon (1963) singled in the degree of openness which is crucial factor to evaluate the optimality of a currency area and thus the convenience of a country to be part of it. Exchange rate stability in this case would significantly reduce transaction costs and risks associated with the presence of multiple currencies. The higher marginal propensity to import is associated with an open economy limit the variability of output and the need for interventions of domestic monetary policy. For McKinnon, therefore, in the case of countries with high trade openness, it is preferable to adopt a fixed exchange rate regime and act on the expenditure components of domestic demand or to improve the foreign trade balance and control the level of domestic prices. Kenen (1969) found more diversified economies to constitute an optimal currency area where any demand shocks that occurred in a given area can pour the whole economy. Diversification, therefore, is an insulation from shocks that interested foreign trade, thus eliminating the need for changes in exchange rates between currencies.

In particular, Krugman and Obstfeld (2003) defined the OCA as the region in which countries are closely linked by trade in goods and services. So the need for greater economic integration allows the elimination of all those distortions and slowed the inter-industry so that the country can become progressively more specialized. Haberler (1970) and Flemming (1971) argued, however, that countries with similar inflation rates could become part of an optimal currency area because, in this way, they could re-balance the flows on the current account. The differential rates of inflation are considered as the main causes of the problems of balance of payments.

Finally, recently, much of the literatures have given importance to the so-called degree of business cycle synchronization and adjustment processes - in front of an asymmetric shock - from the mobility of factors and several damping mechanisms (Bayoumi and Eichengreen, 1994; Alesina, Barro and Tenreyro, 2002). Crowley (2006) in his analysis stating that stage of integration through a sequential process has a positive benefit to achieve further economic integration,but if not then this is a political decision to shift to the stage of certain integration. The forms of economic integration involve different degrees of discrimination between partner countries and between them and third parties (Appleyard et al., 2008; Hill, et al., 2011).

In this theoretical context, the paper has attempted to test the feasibility of trade integration and monetary integration in ASEAN during 1990-2017.

II. Review of literature

There are huge literatures in the areas of economic integration in Asia as well as of ASEAN. The author explains a few important papers which are closely related with the objectives of the paper. Guerrero (2008) showed AEC 2020 goals, initiatives of AFTA, role of Chiang Mai-Initiative and ASEAN Bond Fund for ASEAN integration, prospects of intra-regional trade and intra-regional trade intensity and comment that significant progress has been made with the creation of AFTA which is the first major step of ASEAN en route to economic integration.NTS Bulletin (2017) emphasized the strategic priority to increase trade, allowing ASEAN's MSMEs to reach more markets where the Regional Comprehensive Economic Partnership (RCEP) offers an encompassing economic partnership that can expand trade beyond the ASEAN region. In fact, a statement on the RCEP negotiations, and potentially their conclusions, has been envisioned by an increasing importance of trade and greater integration for ASEAN economies. Now, more than ever, there is a pressing need to ensure benefits of this economic growth are accessible to all.Using GTAP 9 Migration database with 2007 and 2011 base year,Andrista and Widodo(2017) found that the welfare gains of ASEAN member countries in implementation of ASEAN free trade area is higher than the ASEAN customs union, and the welfare gains of ASEAN member countries in implementation of the ASEAN Economic Community is higher than the ASEAN common market. It is very likely that the ASEAN member countries are moving towards deeper economic inter-dependence, and the ASEAN member countries seems more prepared towards full implementation of the ASEAN free trade area and the ASEAN Economic Community.

ASEAN Secretariat (2017) framed the ASEAN Vision 2020 in which free flow of goods, skilled labour, services, investment, capital, were emphasized. Food, agriculture and forestry, development of SME, and initiative on ASEAN integration were given priority. For acceleration of RCEP, the dialogue partners with Australia (1974), Canada (1977), China (1991), European Union (1977), India (1992), Japan (1973), Republic of Korea (1989), New Zealand (1975), Russia (1996), United States (1977), the Sectoral Dialogue Partners with Norway (2015), Pakistan (1993) and Switzerland (2016) and Development Partner with Germany (2016) were activated in the process. At the 7th ASEAN Summit, the ASEAN Business Advisory Council (ASEAN-BAC) was formed in 2003 where business council of ASEAN with Australia, Canada, China, EU, India, Japan, Korea, New Zealand and USA were launched. The AEC Blueprint 2025 will reinforce on (i) A Highly Integrated and Cohesive Economy;(ii) A Competitive, Innovative, and Dynamic ASEAN; (iii) Enhanced Connectivity and Sectoral Cooperation; (iv) A Resilient, Inclusive, People-Oriented and People-Centred ASEAN; and (v) A Global ASEAN. To achieve Financial integration,it has have been formulated six targets viz, [i] The Chiang Mai Initiative Multilateralisation Agreement (2010), [ii] The ASEAN Financial Integration Framework (2011),

[iii] The ASEAN Insurance Integration Framework (2011), [iv] The Capital Account Liberalisation Heat Map (2013), [v] The ASEAN Banking Integration Framework (2014), and [vi] The ASEAN Capital Market Infrastructure Blueprint (2014).

Li and Whalley (2014) observed that the current efforts toward regionalism are intended to build non-discriminatory blocs, which may eventually lead to a more integrated world economy, including the elimination of non-tariff barriers (NTBs) which is one of the pending issues in ASEAN liberalization agenda. Moreover,Li and Whalley(2016) opined that the prospects of full integration in the form of a trade bloc may represent the most important development in terms of trade agreements in the near future and the realization of a fully integrated ASEAN comprehensive bloc is a matter of debate.ASEAN Economic Integration Brief-No-1(2017) assessed that the new Blueprint envisions an AEC which, by 2025, is highly integrated and cohesive; competitive, innovative and dynamic; with enhanced connectivity and sectoral cooperation; more resilient, inclusive, and people-oriented,and is integrated with the global economy.In placing trade facilitation at the very core of ASEAN's commitment to market integration, the ASEAN Economic Ministers adopted the ASEAN Trade Facilitation Framework in 2016 and, at their 23rd Retreat in March 2017, set the target to reduce 10% of trade transaction costs by 2020. The ASEAN Trade Repository (ATR) is a one-stop online database on ASEAN trade- and customs-related information where the public can also access the information available on the National Trade Repositories (NTRs) of each AMS. Linked to the ATR is the ASEAN Tariff Finder, a cost-free search engine for tariff and tariff related information under ASEAN and ASEAN +1 free trade agreements (FTAs). The Initiative for ASEAN Integration (IAI) Work Plan III was adopted in 2016, and provides special assistance to Cambodia, Lao PDR, Myanmar and Viet Nam(CLMV) to further regional integration in order to narrow the development gap within ASEAN.The recently endorsed AEC 2025 Monitoring and Evaluation (M&E) Framework plays a key role to assess implementation progress of the AEC Blueprint 2025. The assessment can benefit from a systematic and well-targeted information dissemination process and mechanism to capture stakeholder feedbacks.

Rules of Origin (RoO) are integral part of the proliferating Free Trade Area (FTAs) or the non-reciprocal Preferential trading agreement (PTAs) such as the Generalized System of Preferences (GSP). RoO are required in any PTA to prevent trade deflection, by which is meant that the country with the lowest external tariff acts as port of entry for the entire bloc's imports, depriving partners of tariff revenue.Pangestu and Ing(2017) observed that the AFTA rules of origin (RoO) and the ASEAN+1 FTAs have a simple and transparent structure, with a large chunk of trade flows subject to a 40% regional value content (RVC–40) or a change of tariff classification (Medalla and Balboa, 2009). Whereas the official costs of obtaining an FTA COO (certificate of origin) are

perceived to be reasonable, the procedure is cumbersome. A recent econometric analysis of Cadot and Ing(2015) on the cost of compliance with ASEAN's RoO at the Harmonized System (HS) six-digit product level uncovers evidence of moderately restrictive effects, with an average tariff equivalent across all measures and products, of 3.40% (2.09% using trade-weighting). Authors set two policy recommendations (i) generalize alternate RoO such as regional value content or change in tariff heading, and (ii) simplify and streamline RoO in light industries such as apparel, footwear, and prepared foods.

A single currency would promote economic growth of ASEAN region as transaction costs and fluctuation costs are eliminated which increase trade and investment within the region and attract investors from outside the region. It helps to promote trade within regional area as it is easier to trade by using a single currency. In addition, a single currency also allows businesses to have better planning as it eliminated the fluctuation cost. However, countries have to give up for their national sovereignty as monetary policies will be implemented by ASEAN Central Bank. ASEAN region is just not ready yet to implement a single currency as ASEAN intra-regional trade is not strong enough. In addition, economic development in the region shows too big differentials. For instance, the first groups are those nations which are advanced economies such as Brunei, Malaysia, Indonesia, Thailand, Singapore and Philippines. The second groups are those nations which are least developed such as Laos, Vietnam, Myanmar and Cambodia.

Kentaro (2012) investigated whether East Asian countries, ASEAN, China, Korea and Japan can match OCA and found that1) the combinations of ASEAN 5 countries with 'plus one' country: Korea or Japan, can form the common currency area, 2) the combinations ASEAN 5 with 'plus two'countries: China and Japan, Korea and Japan, or China and Korea can form a common currency area, and 3) ASEAN 5 plus three countries have come closer to OCA for the period including recent years. Gharleghi,Shafighi and Chan Yin Fah(2015) studied pre and post crisis period of ASEAN and found weak support for regional monetary arrangements. Chow and Kim (2003) investigated the feasibility of an OCA in East Asian Countries by employed a three-variable VAR model with global, regional and local outputs. They assumed that regional and local shocks do not have any long run effects on global output and local shock do not have any effects on regional output. On the other hand, local countries are small in the region and region is small on the global economy. The results showed that based on the OCA indicators, it is costly for East Asian Countries to form a common currency union. Mohseni and Azali(2014) examined the results of a ten-variable VAR model show that forming an OCA for all of the countries in the region is costly and difficult to sustain. But at first five countries called Japan, China, Korea, Malaysia, and the Philippine with symmetric supply shocks can create the OCA.Bayoumi et al. (2000) analyze the ASEAN+3 countries to form an OCA. They employed the

methodology of Bayoumi and Eichengreen (1994) and after analyzing and comparing the ASEAN+3 countries with EMU, they argued that however these countries are less suitable to form an OCA but they are not significantly in worse position than the EU before the Maastricht Treaty. They believed that the most important condition to shape an OCA is political rather than economical. Bayoumi and Mauro(1999) assumed to culminate the ASEAN regional currency and is less suitable before European Monetary Union. Ng. T. (2002) examined the correlation along the Hodrick-Prescott economic shocks between five ASEAN economies through annual data of real and nominal GDP for a period from 1970 to 1995 stated that even in the presence of asymmetric shocks, the ASEAN easily be able to implement a process of adjustment under the high economic and trade integration in the area. Among the contributions that instead discourage the possibility of a monetary union among the ASEAN countries. Thong,Santhapparaj and Hossain(2010) test OCA for single currency in ASEAN and rejected the idea of forming an OCA within the member countries of ASEAN like EU and suggested the feasible sub regions to form the OCA within these ASEAN-5. Bacha (2011) examines the feasibility of a Common Currency Area (CCA) for ASEAN and the broader ASEAN +5. Using macro-economic data for 14 East Asian countries over the 34-year period during 1970–2003 through A Vector Autoregression Model and Correlation Analysis examined common linkages among the 14 sample countries. The findings imply that while a region-wide CCA may not now be feasible, a strategy of beginning with paired clusters and then expanding may be a logical progression if a currency union is a desired objective. Tran(2018) examined ASEAN data during 1997M1 to 2017M7 and suggested that the governments should highly focus on building a fully-fledged ASEAN common market, and later, an economic union rather than embarking prematurely on an ASEAN monetary union.

III. Objectives of the paper

The paper seeks to explain the nature and problems and prospects of trade integration of ASEAN bloc and the paper also analysed that which factors would influence the trade integration parameters of ASEAN during 1990-2017. The cointegration test and vector error correction models showed the linkages between the parameters of trade integration and the factors of macro economics variables.Another goal of the paper is to check the feasibilities of optimum currency area through convergence hypothesis for adoption of a single currency in ASEAN after reforming monetary and financial sectors of the bloc during the above period.

IV. Methodology and source of data

Growth rates of the variables have been calculated through semilog linear trend model. Bai-Perron (2003) model was used to show the structural breaks.

Using the Cochrane-Orcutt model (1949) the author calculated growth rate from trend equation and predicted value in 2030. Multivariate regression model was used to show the simple relation between intra export and intra import shares with GDP, FDI, REER, openness and inflation during 1990-2017. Johansen cointegration model(1988) examined the long run association among them. Vector Error Correction Model has found out the long run causality through cointegrating equations and even the short run causality was tested by Wald test (1943). Optimum Currency Area criteria was tested through Beta and Sigma convergence hypothesis of Sala-i-Martin (1996) during 1990-2017. Data on interest rate, inflation rate, fiscal deficit, external debt/GDP, exchange rate, REER, FDI inflows, GDP, openness ,exports, imports, world export share, world import share, intra export share, intra import shares of ASEAN from 1990 to 2017 have been taken from UNCTAD, Key Indicators of Asia and Pacific countries, Asian Development Outlook and the World Bank respectively.

V.Key findings of the models

[1] Prospects of ASEAN trade

The prospects of international trade and intra trade of ASEAN are rosy.The export of ASEAN had been increasing at the rate of 8.15% per year during 1990-2017 in comparison with 7.65% per year of import.The world share of export and imports were 1.21% and 0.77% per year respectively during 1990-2017.The export growth surpassed the import growth and obviously the trade balance was turned into positive from 1997 which was accelerated rapidly.On the other hand the regional trade was not brighter than the international trade.The growth rate of intra export share had been catapulted at the rate of 0.809% per year during 1990-2017 and the intra import share rose at the rate of 1.469% per year during the same period. (Table 1)

Table 1: Growth Rates of ASEAN Trade from 1990 to 2017

Item	Growth rate % per year	Significant/non significant at 5%
Intra export share	0.809	Significant
Export	8.15	Significant
World export share	1.21	Significant
Intra import share	1.469	Significant
Import	7.65	Significant
World import share	0.77	significant

Source: Calculated by author

The patterns of ASEAN trade were observed structural shifts upward in every respect which implied that the intra export share has structural shifts upward in 1994 and intra import share had structural shifts upward in 1994,1998,2003 and in 2011 respectively. ASEAN export shifted upward structurally in 1994, 2000, 2005, and 2010 and ASEAN import had upward

structural shifts in 1994, 2004 and 2011. The ASEAN world export share shifted structurally upward in 1994, 2010, 2015 and world import share shifted structurally upward in 2010 only. These patterns have been arranged in the Table 2.

Table 2: Structural breaks of ASEAN trade from 1990 to 2017

Item	Years of Structural breaks	Upward/ downward	Significant/non significant at 5%
Intra export share	1994	Upward	Significant
Export	1994, 2000, 2005, 2010	Upward	Significant
World export share	1994, 2010, 2015	Upward	Significant
Intra import share	1994, 1998, 2003, 2011	Upward	Significant
Import	1994, 2004, 2011	Upward	Significant
World import share	2010	Upward	significant

Source: Calculated by author

Some of the important indicators of regional trade prospects have been calculated for ASEAN trading bloc in which FDI,Intra export share,intra import share,GDP are favourable including their forecasted values in 2030 but openness declined and went to unfavourable development of ASEAN trade.

Table 3: Forecast of indicators of ASEAN

	Foreign Direct Investment inflows(m$)	Intra-export share (%)	Intra-import share (%)	GDP (MUS$)	Openness
Growth rate (1990-2018)	9.92%	0.252	1.45	5.71%	-0.485%
Predicted growth rate (2019-2030)	10.359%	1.218	1.24	3.39%	-2.06%
Value-1990	12821m$	23.0	15.0	4179230	50.0
Value-2018	145850 m$	24.9	24.0	22455870	68.50
Predicted Value-2030	205726 m$	25.84	23.40	35396666	65.85

Source: Calculated by Author

ASEAN GDP had significant positive impact on export,world export share and intra export share,import,world import share but positive impact is insignificant on intra import share during 1990-2016.FDI of ASEAN had significant positive effects on ASEAN world export share and import share and it had insignificant negative impact on intra export and import share respectively. Openness affects significantly positive on ASEAN world export and import shares during the survey period but it affects positively on intra export share insignificantly and affects import shares of ASEAN negatively which is significant. Even, the export of ASEAN is insignificantly negative

due to openness but positive and significant on import as changes in openness. The REER affects export and import of ASEAN negatively and significantly and it affects negatively on world export and import share and intra export and import shares of ASEAN during 1990-2016.All these results have been shown in Table 4.

Table 4: Estimated Regressions during 1990-2016

Variables	constant	Log(gdp)	Log(fdi)	Log(openness)	Log(reer)	R^2	F	DW
Log(x_1)	5.065	0.2007	0.0437	-0.01417	-1.1738	0.761	17.595*	0.742
	(3.85)*	(2.61)*	(1.11)	(-0.18)	(-3.71)*			
Log(x_2)	-6.105	0.99559	0.221	1.033	-0.7119	0.988	481.46*	0.962
	(-2.94)*	(8.21)*	(3.56)*	(8.55)*	(-1.42)			
Log(x_3)	-1.544	0.3223	-0.0611	0.9338	-0.4201	0.723	14.40*	0.59
	(-0.84)	(3.01)*	(-1.11)	(1.84)	(-0.953)			
Log(m_1)	1.73	0.2142	0.0351	0.5247	-0.9909	0.93	73.49*	1.19
	(1.48)	(3.14)*	(1.005)	(7.70)*	(-3.52)*			
Log(m_2)	-2.20	0.914	0.2814	0.5365	-0.9419	0.98	364.24*	1.35
	(-0.99)	(7.03)*	(4.07)*	(4.13)*	(-1.95)			
Log(m_3)	2.26	0.2501	-0.0045	-0.3224	-0.6596	0.51	5.93*	0.58
	(1.03)	(1.94)	(-0.06)	(-2.51)*	(-1.24)			

Source: Calculated by author,*=significant at 5% level, Figures in the parenthesis are t values

Johansen cointegration test suggested that there are at least two cointegrating equations among the said variables. It implies that long run association among them exists with 5% significant level.

Table 5: Johansen Cointegration

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.885254	139.2875	95.75366	0.0000
At most 1 *	0.760982	85.16169	69.81889	0.0018
At most 2 *	0.528823	49.38125	47.85613	0.0357
At most 3 *	0.434990	30.56821	29.79707	0.0407
At most 4 *	0.381891	16.29540	15.49471	0.0378
At most 5 *	0.156947	4.268145	3.841466	0.0388
Hypothesized No. of CE(s)	Eigen value	Max Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.885254	54.12583	40.07757	0.0007
At most 1 *	0.760982	35.78043	33.87687	0.0293
At most 2	0.528823	18.81304	27.58434	0.4291
At most 3	0.434990	14.27282	21.13162	0.3431
At most 4	0.381891	12.02725	14.26460	0.1096
At most 5 *	0.156947	4.268145	3.841466	0.0388

* denotes rejection of the hypothesis at the 0.05 level
** MacKinnon-Haug-Michelis (1999) p-values
Source: Computed by author

The estimates of vector error correction model are as follows.Change in intra export share is positively related with changes of one period lag ofGDP,inflation, and FDI insignificantly but related negatively with openness significantly and REER insignificantly and one error correction term insignificantly approaches to equilibrium.The change of GDP is positively related with one period lag inflation and FDI significantly and is negatively related with REER and intra export share significantly where one error correction significantly approaches to equilibrium.The change of FDI is affected positively with lag GDP and inflation where latter is significant but affected negatively from intra export share,openness significantly and REER insignificantly.Error correction terms are divergent.Change in openness is affected positively with FDI and negatively with intra export share,GDP,REER and inflation insignificantly where all error correction terms have been moving equilibrium insignificantly.Change of REER is related negatively with lag of intra export share and openness and is positively related with GDP and FDI where only FDI is significant.One error correction term is moving to equilibrium insignificantly.Lastly,change in inflation is negatively associated with intra export share,GDP,and FDI significantly and is positively associated with openness which is significant .One error correction term insignificantly tends to equilibrium. (Table 6).

Table 6: Vector Error Correction Model

	VECM-1 $d(log(x_1))$	VECM-2 $d(log(GDP))$	VECM-3 $d(log(FDI))$	VECM-4 $d(log$ $(Openness))$	VECM-5 $d(log$ $(REER))$	VECM-6 $d(log$ $(Inflation))$
EC_1	-0.010866	0.910886	3.128727	-0.610390	-0.089923	0.217827
T values	[-0.03913]	[2.23364]*	[2.71387]*	[-0.93079]	[-0.43734]	[0.65720]
EC_2	0.169879	-0.463868	2.183065	-0.210196	0.125281	-0.305414
T values	[1.10225]	[-2.04937]*	[3.41164]*	[-0.57749]	[1.09777]	[-1.66016]
$d(log(x_1(-1)))$	0.047322	-1.315289	-3.489114	0.435101	-0.251744	-0.130151
T values	[0.13668]	[-2.58666]*	[-2.42720]*	[0.53212]	[-0.98192]	[-0.31492]
$d(log(GDP(-1)))$	0.115282	0.706205	0.459446	-0.283448	0.034699	-0.106308
T values	[0.826]	[3.445]*	[0.792]	[-0.859]	[0.335]	[-0.638]
$d(log(FDI(-1)))$	0.052123	0.122669	0.733068	0.059541	0.058109	-0.032282
T values	[1.43475]	[2.29914]*	[4.86010]*	[0.69398]	[2.16012]*	[-0.74443]
$d(log(Openness(-1)))$	-0.392681	-0.376330	-2.138684	-0.103136	-0.121775	0.399029
T values	[-2.78686]*	[-1.81857]	[-3.65577]*	[-0.30993]	[-1.16713]	[2.37247]*
$d(log(REER(-1)))$	-0.163214	-0.568480	-0.043853	-1.511911	0.113491	0.086074
T values	[-0.41709]	[-0.98918]	[-0.02699]	[-1.63600]	[0.39167]	[0.18428]
$d(log(Inflation(-1)))$	0.931572	0.959394	4.256264	-0.323005	0.173883	-0.596820
T values	[3.07733]*	[2.15794]*	[3.38643]*	[-0.45180]	[0.77571]	[-1.65166]
C	-0.063666	-0.045880	-0.249479	0.053613	-0.011952	0.102052
T values	[-3.15294]*	[-1.54710]	[-2.97575]*	[1.12423]	[-0.79937]	[4.23399]*
R^2	0.496195	0.689276	0.821521	0.320439	0.342850	0.412222
F	1.969787	4.436572	9.205788	0.943075	1.043444	1.402648
AIC	-3.632522	-2.863848	-0.785401	-1.913786	-4.233429	-3.278479
SC	-3.193726	-2.425052	-0.346606	-1.474991	-3.794634	-2.839684

Source: Calculated by author

The normalized two cointegrating equations have been calculated and are given below in Table 7.

Table 7: Cointegrating equations

	$log(x_1(-1))$	$log(GDP(-1))$	$log(FDI(-1))$	$log(Openness(-1))$	$log(REER(-1))$	$log(inflation(-1))$	C
Cointegrating equation-1	1.0	0.0	-0.164004	-0.075565	0.232743	0.175307	-3.022258
T values			[-11.6005]*	[-1.17816]	[1.52141]	[4.79750]*	
Cointegrating equation-2	0.0	1.0	-0.278863	0.356938	-0.960460	-0.418741	-8.238461
T values			[-8.07721]*	[2.27891]*	[-2.57098]*	[-4.69258]*	

Source: Calculated by author

In the system equation -1,the two cointegrating equations become;

Table 8: Cointegrating equations of system equation-1

	$log(x_1(-1))$	$log(GDP(-1))$	$log(FDI(-1))$	$log(Openness(-1))$	$log(REER(-1))$	$log(inflation(-1))$	C
[1]dlog(x_1)	-0.131902	0.0	-0.164004	-0.075565	0.232743	0.175307	-3.022258
T values	-0.527277		[-11.6005]*	[-1.17816]	[1.52141]	[4.79750]*	
[2]dlog(x_1)	0.0	0.222477	-0.278863	0.356938	-0.960460	-0.418741	-8.238461
T values		1.534728	[-8.07721]*	[2.27891]*	[-2.57098]*	[-4.69258]*	

Source: Calculated by author

Cointegrating equation 1 is approaching towards equilibrium but it is insignificant since t value of log(x_1(-1)) is insignificant yet it can be said that there are long run causalities from GDP,FDI,Openness ,REER and inflation rate to the intra export share of ASEAN during 1990-2016.

In the system equation -2, the two cointegrating equations have shown in Table 9.

Table 9: Cointegrating equations of system equation-2

	$log(x_1(-1))$	$log(GDP(-1))$	$log(FDI(-1))$	$log(Openness(-1))$	$log(REER(-1))$	$log(inflation(-1))$	C
[1]dlog (GDP)	0.452999	0.0	-0.164004	-0.075565	0.232743	0.175307	-3.022258
T values	[1.06770]		[-11.6005]*	[-1.17816]	[1.52141]	[4.79750]*	
[2]dlog (GDP)	0.0	-0.264887	-0.278863	0.356938	-0.960460	-0.418741	-8.238461
T values		[-1.077393]	[-8.07721]*	[2.27891]*	[-2.57098]*	[-4.69258]*	

Source: Calculated by author

Cointegrating equation-2 has been moving towards equilibrium which is insignificant. Thus long run causalities from intra export share, FDI, openness, REER and inflation rate to GDP of ASEAN during 1990-2016 are insignificant.

In the system equation -3, the two cointegrating equations have been arranged in the Table 10.

Table 10: Cointegrating equations of system equation-3

	log(x_1 (-1))	log(GDP (-1))	log(FDI (-1))	log(Open-ness(-1))	log(REER (-1))	log(infla-tion(-1))	C
[1]dlog (FDI)	1.976833	0.0	-0.164004	-0.075565	0.232743	0.175307	-3.022258
T values	[1.701113]*		[-11.6005]*	[-1.17816]	[1.52141]	[4.79750]*	
[2]dlog (FDI)	0.0	2.683637	-0.278863	0.356938	-0.960460	-0.418741	-8.238461
T values		[3.985170]*	[-8.07721]*	[2.27891]*	[-2.57098]*	[-4.69258]*	

Source: Calculated by author

Thus there are no long run causalities from intra export share, GDP, REER and inflation rate to FDI of ASEAN during 1990-2016.

In the system equation -4, the two cointegrating equations are shown in the Table 11.

Table 11: Cointegrating equations of system equation-4

	log(x_1 (-1))	log(GDP (-1))	log(FDI (-1))	log(Open-ness(-1))	log(REER (-1))	log(infla-tion(-1))	C
[1]dlog (Openness)	-0.5064	0.0	-0.164004	-0.075565	0.232743	0.175307	-3.022258
T values	[-0.880]*		[-11.6005]*	[-1.17816]	[1.52141]	[4.79750]*	
[2]dlog (openness)	0.0	-0.2553	-0.278863	0.356938	-0.960460	-0.418741	-8.238461
T values		[-0.765]*	[-8.07721]*	[2.27891]*	[-2.57098]*	[-4.69258]*	

Source: Calculated by author

Both the equations showed that there are insignificant long run causalities from intra export share, GDP, FDI, REER and inflation rate to openness of ASEAN during 1990-2016.

In the system equation -5, the two cointegrating equations are shown in the Table 12.

Table 12: Cointegrating equations of system equation-5

	log(x_1 (-1))	log(GDP (-1))	log(FDI (-1))	log(Open-ness(-1))	log(REER (-1))	log(infla-tion(-1))	C
[1]dlog (REER)	-0.0899	0.0	-0.164004	-0.075565	0.232743	0.175307	-3.022258
T values	[-0.4371]*		[-11.6005]*	[-1.17816]	[1.52141]	[4.79750]*	
[2]dlog (REER)	0.0	0.12528	-0.278863	0.356938	-0.960460	-0.418741	-8.238461
T values		[1.097]*	[-8.07721]*	[2.27891]*	[-2.57098]*	[-4.69258]*	

Source: Calculated by author

The equation 1 assured that there are insignificant long run causalities from intra export share, FDI,openness and inflation rate to REER of ASEAN during 1990-2016.

In the system equation -6,the two cointegrating equations are given in the Table 13.

Table 13 : Cointegrating equations of system equation-6

	log(x$_1$ (-1))	log(GDP (-1))	log(FDI (-1))	log(Open-ness(-1))	log(REER (-1))	log(infla-tion(-1))	C
[1]dlog (inflation)	0.2725	0.0	-0.164004	-0.075565	0.232743	0.175307	-3.022258
T values	[0.9361]*		[-11.6005]*	[-1.17816]	[1.52141]	[4.79750]*	
[2]dlog (inflation)	0.0	-0.32921	-0.278863	0.356938	-0.960460	-0.418741	-8.238461
T values		[-1.952]*	[-8.07721]*	[2.27891]*	[-2.57098]*	[-4.69258]*	

Source: Calculated by author

The equation-2 confirmed that there are insignificant long run causalities from GDP, FDI,openness and REER to inflation rate of ASEAN during 1990-2016.

Table 14: Short Run causality

	Chi-square(1)	Probability	Causality
Causality from openness to intra export share of ASEAN	8.24147	0.004	Significant causality
Causality from inflation to intra export share of ASEAN	8.989	0.0027	Significant causality

Source: Calculated by author

The Wald test for coefficients of the system equation 1-6 verified that there are significant short run causalities from openness and inflation rate to the intra export share of ASEAN.

Two cointegrating equations have been plotted in the Figure 1 where it is visible that the second equation has been marching towards equilibrium but it is not significant at 5% level.

Johansen cointegration test between intra import share, GDP, FDI, REER, Openness, Inflation of ASEAN during 1990-2017 showed at least four cointegrating equations in the first difference series which were confirmed by trace statistic and max-eigen statistic.

The VECM states that change of intra import share is negatively influenced by GDP,FDI and inflation of one year lag which are insignificant but is positively influenced by REER and openness of one year lag insignificantly where two error correction terms are moving towards equilibrium although they are not significant. The change of GDP is negatively affected by intra import share,openness of lag one insignificantly but is positively affected by REER and FDI insignificantly where one error correction term tends to equilibrium although it is insignificant. The change of FDI is negatively related
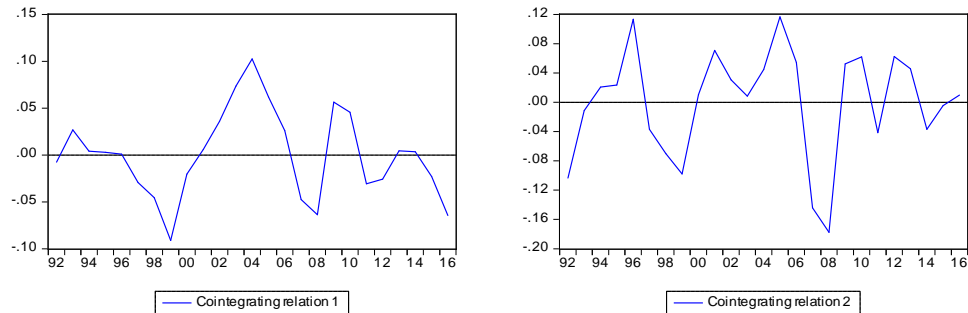
Figure 1: Nature of cointegrating equations
Source: Plotted by author

Table 15 : Johansen cointegration test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.890438	154.4186	95.75366	0.0000
At most 1 *	0.782863	99.13691	69.81889	0.0000
At most 2 *	0.700180	60.95620	47.85613	0.0019
At most 3 *	0.525789	30.84186	29.79707	0.0378
At most 4	0.227038	12.18930	15.49471	0.1481
At most 5 *	0.205503	5.751161	3.841466	0.0165
		Max-Eigen Statistic		
None *	0.890438	154.4186	95.75366	0.0000
At most 1 *	0.782863	99.13691	69.81889	0.0000
At most 2 *	0.700180	60.95620	47.85613	0.0019
At most 3 *	0.525789	30.84186	29.79707	0.0378
At most 4	0.227038	12.18930	15.49471	0.1481
At most 5 *	0.205503	5.751161	3.841466	0.0165

Source: Calculated by author,* denotes rejection of hypothesis at 5% significant level,**=MacKinnon-Michelis (1999) p value.

with GDP and openness of lag one where later is significant but is positively related with REER, intra import share and inflation where only inflation is significant. One error correction term is moving towards equilibrium significantly. The change of openness is negatively related with GDP, REER and inflation of lag one and is positively related with intra import share and FDI although all are insignificant.One error correction term is tending to equilibrium insignificantly. The change of REER is affected negatively by intra import share, GDP, openness of lag one and is affected positively by FDI of lag one in which all are insignificant where one error correction term is moving towards equilibrium insignificantly.Lastly,the change of inflation rate is negatively related with intra import share, GDP, FDI of lag one insignificantly but is positively related with REER and openness of lag one when latter is significant. One error correction term is approaching towards equilibrium significantly.

Table 16: VECM for intra import share

	VECM-1 d(log (m_1))	VECM-2 d(log (GDP))	VECM-3 d(log (FDI))	VECM-4 d(log (Openness))	VECM-5 d(log (REER))	VECM-6 d(log (Inflation))
EC_1	-0.426466	0.348167	-2.057591	0.420322	-0.013338	0.451124
T values	[-1.72413]	[0.98021]	[-2.13578]*	[0.77440]	[-0.07249]	[1.75990]
EC_2	-0.192535	-0.377775	2.792644	-0.539172	0.110585	-0.454308
T values	[-1.11954]	[-1.52971]	[4.16926]*	[-1.42875]	[0.86441]	[-2.54911]*
EC_3	-0.004560	-0.018446	-0.895172	0.114983	-0.024702	0.065992
T values	[-0.12827]	[-0.36131]	[-6.46463]*	[1.47386]	[-0.93401]	[1.79112]
d(log(m_1(-1)))	0.214039	-0.098937	1.723364	0.285604	-0.136014	-0.211507
T values	[0.67488]	[-0.21724]	[1.39515]	[0.41039]	[-0.57651]	[-0.64352]
d(log(GDP(-1)))	-0.068048	0.305650	-0.334909	-0.189872	-0.041723	-0.137544
T values	[-0.58163]	[1.81931]	[-0.73498]	[-0.73960]	[-0.47941]	[-1.13445]
d(log(FDI(-1)))	-0.059956	0.029518	0.415982	0.007150	0.060807	-0.065660
T values	[-1.31027]	[0.44921]	[2.33407]*	[0.07121]	[1.78636]	[-1.38463]
d(log(Openness(-1)))	0.226889	-0.047342	-1.714529	0.204583	-0.120829	0.594307
T values	[1.20046]	[-0.17443]	[-2.32912]*	[0.49329]	[-0.85941]	[3.03427]*
d(log(REER(-1)))	0.574675	0.592954	4.134439	-0.985603	0.080882	0.104658
T values	[0.96270]	[0.69173]	[1.77828]	[-0.75243]	[0.18214]	[0.16918]
d(log(Inflation(-1)))	-0.359318	0.906497	4.064965	-1.080783	0.374425	-0.813719
T values	[-1.01527]	[1.78368]	[2.94899]*	[-1.39168]	[1.42220]	[-2.21863]*
C	0.038838	-0.021778	-0.228747	0.089334	-0.018072	0.121671
T values	[1.64981]	[-0.64423]	[-2.49484]*	[1.72937]	[-1.03198]	[4.98736]
R^2	0.545410	0.696754	0.839669	0.401119	0.322989	0.547747
F	1.999638	3.829422	8.728523	1.116299	0.795134	2.018586
AIC	-3.531928	-2.808210	-0.812636	-1.960170	-4.123654	-3.460586
SC	-3.044378	-2.320659	-0.325085	-1.472619	-3.636104	-2.973036

Source: Calculated by author

The three normalized cointegrating equations of the VECM of the intra import share of ASEAN during 1990-2016 are shown in the following table 17.

Table 17: Cointegrating equations

	log(m_1(-1))	log(GDP(-1))	log(FDI(-1))	log(Openness(-1))	log(REER(-1))	log(Inflation(-1))	C
Cointegrating equation-1	1.0	0.0	0.00	-0.188784	0.716315	-0.284378	-4.39387
T values				[-2.19119]*	[2.88139]*	[-6.74058]*	
Cointegrating equation-2	0.0	1.0	0.00	1.561009	0.932207	-1.185361	-21.73130
T values				[9.50715]*	[1.96762]	[-14.7430]*	
Cointegrating equation-3			1.00	5.314712	10.31298	-3.466264	-65.98306
T values				[7.23539]*	[4.86576]*	[-9.63680]*	

Source: Calculated by author

The following are the three cointegrating equations obtained from the system equation-1.

Table 18: Cointegrating equations in system equation-1

	log(m_1 (-1))	log(GDP (-1))	log(FDI (-1))	log(Openness(-1))	log(REER (-1))	log(Infla-tion(-1))	C
[1]dlog (m_1)	-0.33528	0.0	0.00	-0.188784	0.716315	-0.284378	-4.39387
T values	[-1.486]			[-2.19119]*	[2.88139]*	[-6.74058]*	
[2]dlog(m_1)	0.0	-0.24846	0.00	1.561009	0.932207	-1.185361	-21.73130
T values		[-1.552]		[9.50715]*	[1.96762]	[-14.7430]*	
[3]dlog(m_1)			0.00824	5.314712	10.31298	-3.466264	-65.98306
T values			[0.253]	[7.23539]*	[4.86576]*	[-9.63680]*	

Source: Calculated by author.

The first two equations imply that there are long run causalities from GDP, openness, REER, inflation to intra import share of ASEAN so that it tend to equilibrium insignificantly because t values are not significant at 5% level.

From the system equation -2, the cointegrating equations are as follows.

Table 19: Cointegrating equations in system equation-2

	log(m_1 (-1))	log(GDP (-1))	log(FDI (-1))	log(Openness(-1))	log(REER (-1))	log(Infla-tion(-1))	C
[1]dlog (GDP)	0.0889	0.0	0.00	-0.188784	0.716315	-0.284378	-4.39387
T values	[0.255]			[-2.19119]*	[2.88139]*	[-6.74058]*	
[2]dlog (GDP)	0.0	-0.2187	0.00	1.561009	0.932207	-1.185361	-21.73130
T values		[-0.885]		[9.50715]*	[1.96762]	[-14.7430]*	
[3]dlog (GDP)			-0.0548	5.314712	10.31298	-3.466264	-65.98306
T values			[-1.091]	[7.23539]*	[4.86576]*	[-9.63680]*	

Source: Calculated by author

Therefore, the second and third equations imply that there are insignificant long run causalities from openness,FDI,REER,and inflation rate to GDP of ASEAN.

In the system equation-3,the cointegrating equations have been sorted out as follows.

Table 20: Cointegrating equations in system equation-3

	log(m_1 (-1))	log(GDP (-1))	log(FDI (-1))	log(Openness(-1))	log(REER (-1))	log(Infla-tion(-1))	C
[1]dlog (FDI)	-1.9007	0.0	0.00	-0.188784	0.716315	-0.284378	-4.39387
T values	[-2.212]*			[-2.19119]*	[2.88139]*	[-6.74058]*	

	log(m$_1$(-1))	log(GDP(-1))	log(FDI(-1))	log(Open-ness(-1))	log(REER(-1))	log(Infla-tion(-1))	C
[2]dlog (FDI)	0.0	2.696	0.00	1.561009	0.932207	-1.185361	-21.73130
T values		[4.420]*		[9.50715]*	[1.96762]	[-14.7430]*	
[3]dlog (FDI)			-0.8731	5.314712	10.31298	-3.466264	-65.98306
T values			[-7.0392]*	[7.23539]*	[4.86576]*	[-9.63680]*	

Source: Calculated by author

Thus, the first and third equations showed that there are significant long run causalities from intra import share,openness,REER and inflation rate to the FDI of ASEAN and the cointegrating equations have been approaching towards equilibrium.

In the system equation-4, the cointegrating equations have been sorted out as follows.

Table 21: Cointegrating equations in system equation-4

	log(m$_1$(-1))	log(GDP(-1))	log(FDI(-1))	log(Open-ness(-1))	log(REER(-1))	log(Infla-tion(-1))	C
[1]dlog (openness)	0.2992	0.0	0.00	-0.188784	0.716315	-0.284378	-4.39387
T values	[0.615]			[-2.19119]*	[2.88139]*	[-6.74058]*	
[2]dlog (openness)	0.0	-0.4649	0.00	1.561009	0.932207	-1.185361	-21.73130
T values		[-1.346]		[9.50715]*	[1.96762]	[-14.7430]*	
[3]dlog (openness)			0.0979	5.314712	10.31298	-3.466264	-65.98306
T values			[1.395]	[7.23539]*	[4.86576]*	[-9.63680]*	

Source: Calculated by author

Thus, there are insignificant long run causalities from GDP, REER and inflation rate to the openness of ASEAN as was seen from the second equation.

In the system equation-5,the cointegrating equations have been sorted out as follows.

Table 22: Cointegrating equations in system equation-5

	log(m$_1$(-1))	log(GDP(-1))	log(FDI(-1))	log(Open-ness(-1))	log(REER(-1))	log(Infla-tion(-1))	C
[1]dlog (REER)	-0.0133	0.0	0.00	-0.188784	0.716315	-0.284378	-4.39387
T values	[-0.0724]			[-2.19119]*	[2.88139]*	[-6.74058]*	
[2]dlog (REER)	0.0	0.11058	0.00	1.561009	0.932207	-1.185361	-21.73130
T values		[0.8649]		[9.50715]*	[1.96762]	[-14.7430]*	
[3]dlog (REER)			-0.0247	5.314712	10.31298	-3.466264	-65.98306
T values			[-0.934]	[7.23539]*	[4.86576]*	[-9.63680]*	

Source: Calculated by author

Thus,there are insignificant long run causalities from intra import share, openness, FDI, and inflation rate to the REER of ASEAN and two cointegrating equations have been approaching towards equilibrium insignificantly which were observed in first and third equations.

In the system equation-6,the cointegrating equations have been sorted out as follows.

Table 23: Cointegrating equations in system equation-6

	log(m₁ (-1))	*log(GDP (-1))*	*log(FDI (-1))*	*log(Openness(-1))*	*log(REER (-1))*	*log(Inflation(-1))*	*C*
[1]dlog (inflation)	0.4447	0.0	0.00	-0.188784	0.716315	-0.284378	-4.39387
T values	[1.95]			[-2.19119]*	[2.88139]*	[-6.74058]*	
[2]dlog (inflation)	0.0	-0.4503	0.00	1.561009	0.932207	-1.185361	-21.73130
T values		[-2.79]*		[9.50715]*	[1.96762]	[-14.7430]*	
[3]dlog (inflation)			0.06509	5.314712	10.31298	-3.466264	-65.98306
T values			[1.98]	[7.23539]*	[4.86576]*	[-9.63680]*	

Source: Calculated by author

Thus, the second equation showed that there are significant long run causalities from GDP, openness, REER to the inflation rate of ASEAN and the cointegrating equation-2 has been approaching towards equilibrium significantly.

Table 24: Short Run causality

	Chi-square(1)	*Probability*	*Causality*
Short run Causality from openness to FDI of ASEAN	5.8002	0.016	Significant causality
Short run Causality from inflation to FDI of ASEAN	9.8333	0.0017	Significant causality
Short run Causality from openness to inflation rate of ASEAN	5.4344	0.0197	Significant causality

Source: Calculated by author

The Wald test for coefficients of the system equation 1-6 verified that there are significant short run causalities from openness and inflation rate to FDI and inflation rate respectively of ASEAN.

In the VECM,it has been found that three cointegrating equations in which two cointegrating equations have been moving significantly towards equilibrium have been plotted in Figure2 where second and third diagrams have been approaching towards equilibrium.
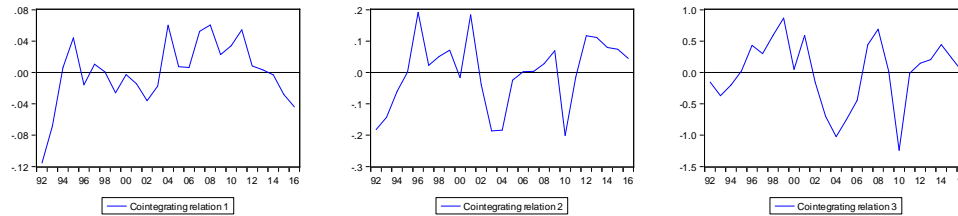
Figure 2: Equilibrium cointegrating equations.

Source: Plotted by author

[2] Prospects of Single currency for ASEAN

Optimum Currency Area and ASEAN

The feasibility study of optimum currency area criterion of ASEAN region during 1990-2017 have been verified through Beta and Sigma convergence hypothesis of Sala-i-Martin model(1996) on interest rate,inflation rate,fiscal deficit as per cent of GDP,external debt as per cent of GDP and exchange rate with US $.In the Beta convergence hypothesis it is assumed that if the growth rate (Beta) of variables within a specified period is significantly inversely related with the five/four year initial averages of the variables then Beta convergence exists.On the other hand,if the trend line of coefficient of variations of the variables during the study period declines significantly then Sigma convergence is satisfied.

[i] Interest rate convergence

The estimated regression equation between the growth rates of interest rate (Beta) and the five year initial values of interest rates of ASEAN region during 1990-2017 is given below.

$\beta = -0.0544 - 0.000519i$

    (-1.504) (-0.219)

$R^2 = 0.009$, F=0.048, DW=1.101 where β = growth rate of interest rate, i = five year average of initial interest rate

This estimated equation is insignificant but its pattern is convergent.This interest rate convergence is depicted in Figure 3below.

The trend line of coefficient of variation of interest rate during 1990-2017 for all countries of ASEAN region is estimated below.

$Log(CV) = -0.7462 + 0.025007t$

    (-6.67)*(3.58)*

$R^2 = 0.338$, F=12.83*, DW=0.97, CV=coefficient of variation of interest rate.

The estimated linear trend line is significant but it is divergent which is plotted in the Figure4 below.
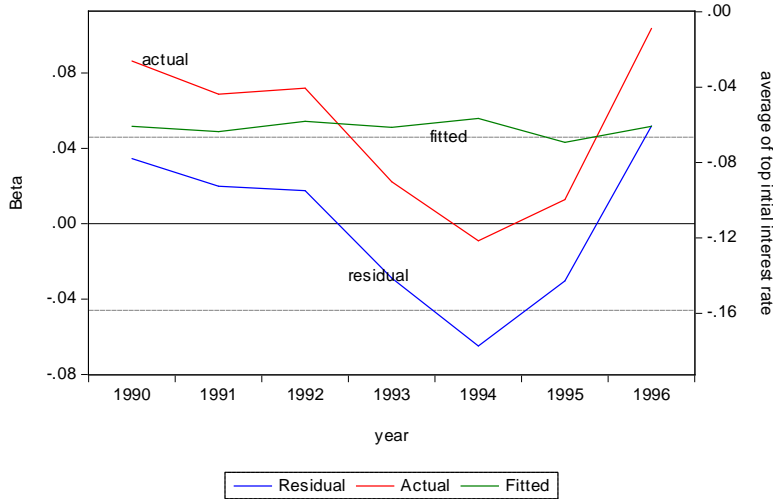
Figure 3 : Interest rate convergence
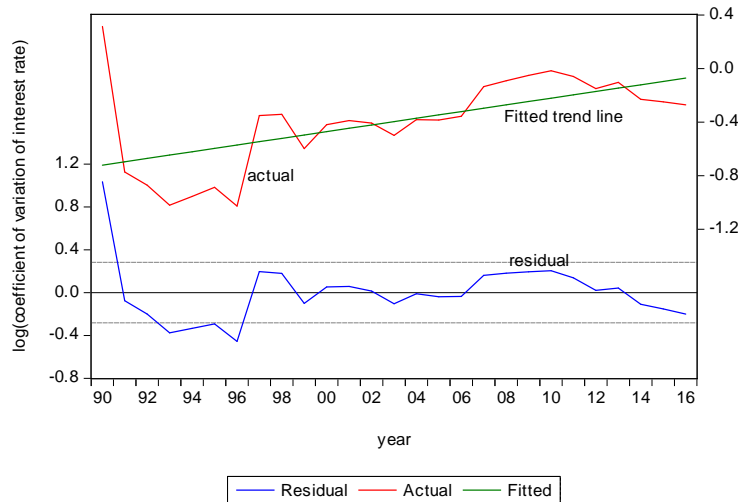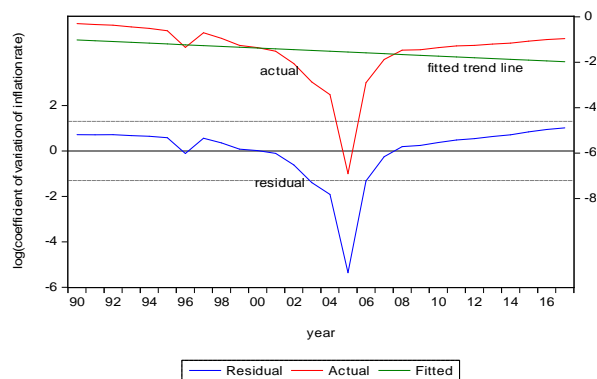
Source: Plotted by author

Figure 4: Sigma convergence of interest rate.

Source: Plotted by author

[ii] Inflation rate convergence

The estimated regression equation between the growth rates of inflation rate (Beta) and the five year initial values of inflation rates of ASEAN countries during 1990-2017 is given below.

β_1= 0.1553-0.00181019 $\bar{I}$

(13.66)*(-9.13)*

R^2=0.92, F=83.45*, DW=3.05 where β_1= growth rate of inflation rate, $\bar{I}$ = the five year initial values of inflation rates,*=significant at 5% level.

The estimated equation is highly significant where $d\beta_1/d\bar{I}<0$ which implies that the Beta convergence hypothesis is satisfied.In Figure 5 ,this estimated relationship has been plotted below.
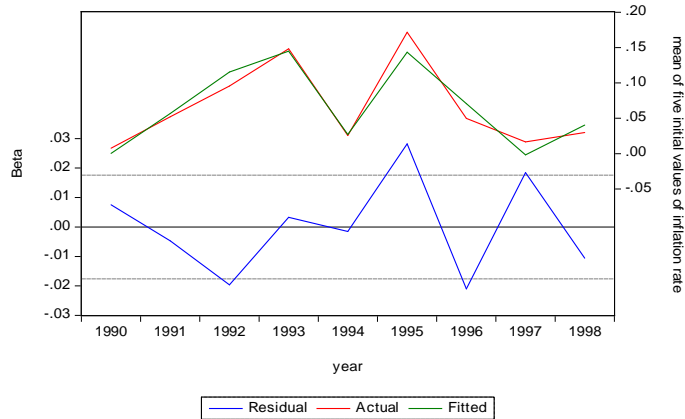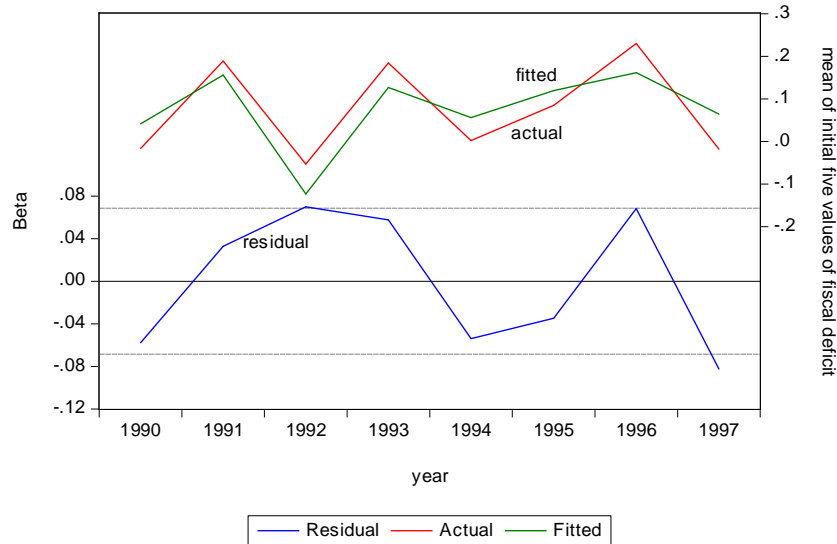

Figure 5 : Beta convergence of inflation rate

Source: Plotted by author

The estimated trend line of coefficient of variation of inflation rate from 1990 to 2017 is shown below.

$Log(CV_1)$=-0.9827-0.035605t

(-1.94) (-1.16)

R^2 = 0.05, F = 1.36, DW=0.72 where CV_1=coefficient of variation of inflation rate.

The Sigma convergence of inflation rate is convergent but it is not significant at 5% level.It is depicted in figure 6 below.

Figure 6 : Sigma convergence of inflation rate

Source: Plotted by author

[iii] Fiscal deficit convergence

The estimated regression equation between the growth rates of fiscal deficit as per cent of GDP(Beta) and the five year initial values of fiscal deficit of ASEAN countries during 1990-2017 is given below.

$\beta_2 = 0.1618-0.02576FD$

$\quad$ (4.71)* (-3.56)*

R^2=0.67, F=12.68*, DW=1.98 where β_2 = growth rate of fiscal deficit, FD= the five year initial values of fiscal deficit,*=significant at 5% level.

The estimated equation is highly significant where $d\beta_2/dFD<0$ which implies that the Beta convergence hypothesis is satisfied. In Figure 7 ,this estimated relationship has been plotted below.

Figure 7 : Beta convergence of fiscal deficit
Source: Plotted by author

The estimated trend line of coefficient of variation of fiscal deficit from 1990 to 2017 is shown below.

$Log(CV_2)=0.2121-0.03816t$

$\quad$ (1.49)   (-4.45)*

R^2=0.43, F=19.89*, DW=1.29 where CV_2=coefficient of variation of inflation rate,*=significant at 5% level.

The Sigma convergence of fiscal deficit is convergent and it is significant at 5% level.It is depicted in figure 8 below.
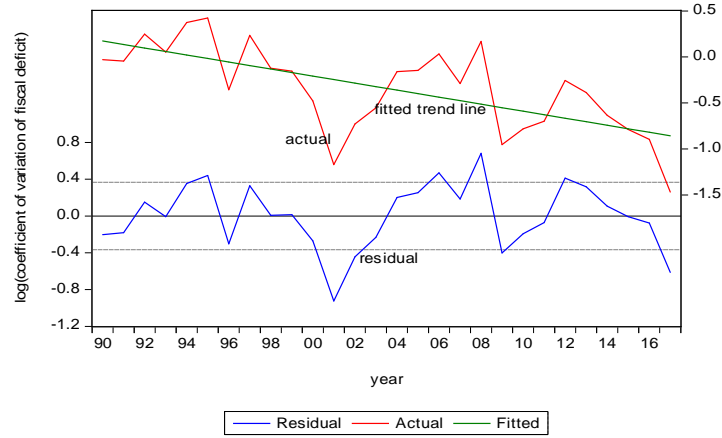
Figure 8: Sigma convergence of fiscal deficit
Source: plotted by author

[iv] External debt convergence

The estimated regression equation between the growth rates of external debt as per cent of GDP(Beta) and the five year initial values of external debt of ASEAN countries during 1990-2017 is given below.

$\beta_3 = 0.020107 - 0.000ED$

    (1.13) (-2.63)*

$R^2 = 0.536, F = 6.93*, DW = 2.22$ where β_3 = growth rate of external debt ,ED= the five year initial values of external debt,* = significant at 5% level.

The estimated equation is highly significant where $d\beta_3/dED < 0$ which implies that the Beta convergence hypothesis is satisfied. In Figure 9 ,this estimated relationship has been plotted below.
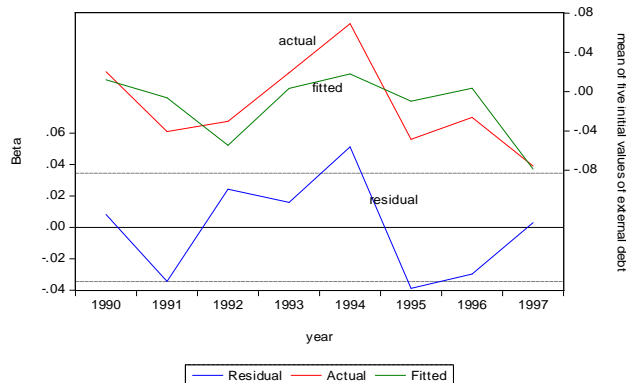

Figure 9: Beta convergence of external debt
Source: Plotted by author

The estimated trend line of coefficient of variation of external debt from 1990 to 2017 is shown below.

$Log(CV_3) = -0.24085 - 0.01841t$

$\quad\quad\quad (-2.51)^* \quad (-3.076)^*$

$R^2 = 0.27$, $F = 9.46^*$, DW = 0.40 where CV_3 = coefficient of variation of external debt, * = significant at 5% level.

The Sigma convergence of external debt is convergent and it is significant at 5% level. It is depicted in figure 10 below.
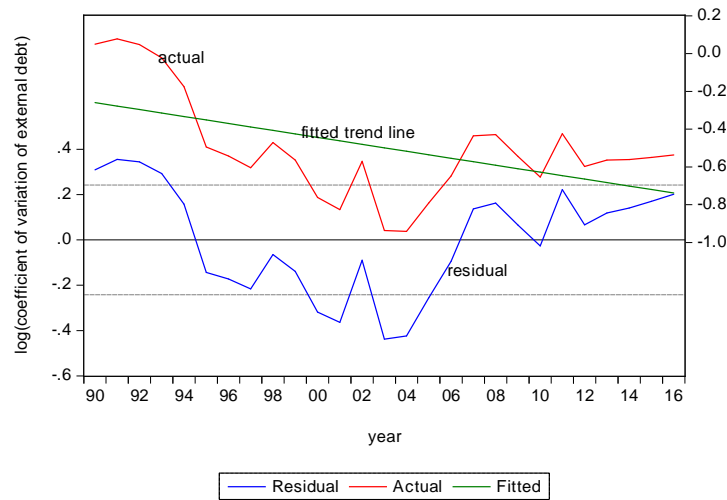

Figure 10: Sigma convergence of external debt
Source: Plotted by author

[v] Exchange rate convergence

The estimated regression equation between the growth rates of exchange rate with US$(Beta) and the five year initial values of exchange rates of ASEAN countries during 1990-2017 is given below.

$\beta_4 = -0.06616 + 0.130549ER$

$\quad\quad (-4.24)^* \quad (2.61)^*$

$R^2 = 0.49$, F = 6.83*, DW = 2.29 where β_4 = growth rate of exchange rate ,ER= the five year initial values of external debt,*=significant at 5% level.

The estimated equation is highly significant where $d\beta_4/dER > 0$ which implies that the Beta divergence hypothesis is satisfied. In Figure 11 ,this estimated relationship has been plotted below.

The estimated trend line of coefficient of variation of exchange rate from 1990 to 2017 is shown below.
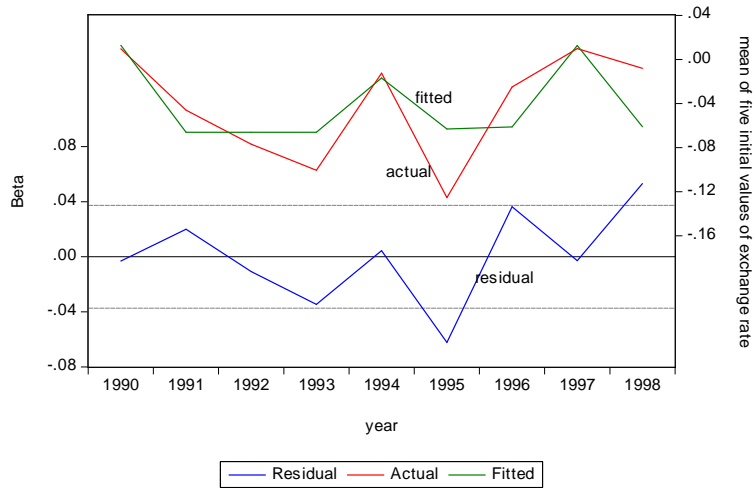
Figure 11 : Beta divergence of external debt
Source: Plotted by author

$$Log(CV_4) = 0.4153 + 0.00447t$$
$$(21.22) \quad (3.79)*$$

$R^2=0.35$, F=14.43*, DW=2.28 where CV_4=coefficient of variation of exchange rate,*=significant at 5% level.

The Sigma convergence of exchange rate is divergent and it is significant at 5% level. It is depicted in figure12 below.
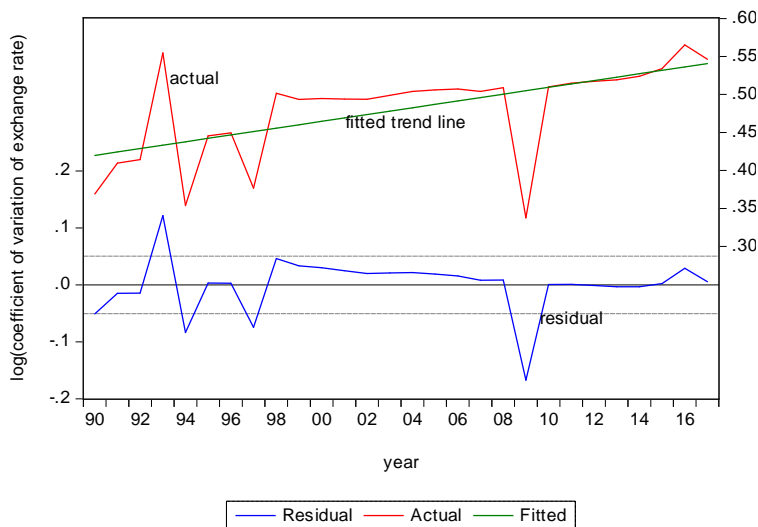

Figure 12 : Sigma divergent of external debt
Source: Plotted by author

Thus the convergence hypothesis of the OCA criterion of ASEAN for a single currency is partially feasible.

VI. Structure of ASEAN Capital Market

At the ASEAN+3 Finance Ministers Meeting on August 7, 2003, all the Finance Ministers agreed to promote the Asian Bond Markets Initiative (ABMI) to develop the bond market in the region. It has targeted the goals on development in three phases.

Phase 1:(2003-2005),the goals are,

[1] Creating new securitized debt instruments

[2] Credit guarantee mechanism

[3] Foreign exchange transactions and settlement issues

[4] Issuance of bonds in local currency by MDBs, foreign government agencies and Asian multinational corporations

[5] Local and regional rating agencies

[6] Technical Assistance Coordination

In Phase 2 (2005 ~ 2008) ,it includes

[i] Creating new securitized debt instruments

[ii] Credit guarantee and investment mechanisms

[iii] Foreign exchange transactions and settlement issues

[iv] Rating system

[v] Technical assistance coordination

In Phase 3 (2008~) "New ABMI Roadmap 2008"was introduced and includes

[1] Promoting issuance of local currency-denominated bonds(e.g. infrastructure financing)

[2] Facilitating the demand of local currency-denominated bonds

(e.g. developments of the investment environment for institutional investors)

[3] Improving regulatory framework(e.g. regulatory harmonization by applying best practices)

[4] Improving related infrastructure for the bond markets(e.g. infrastructure for securities settlement)

The ASEAN Capital Markets Forum or ACMF developed a deep, liquid and integrated regional capital market to meet the objectives of the ASEAN Economic Community (AEC)Blueprint 2015 whose Vision 2025 is to support the AEC Vision 2025 for the ASEAN Economic Community to be "highly integrated and cohesive; competitive, innovative and dynamic; with enhanced connectivity and sectoral cooperation; and a more resilient, inclusive, and

people-oriented, people-centred community, integrated with the global economy". It has three objectives,such as :[i] Enhancing and facilitating growth and connectivity; [ii] Promoting and sustaining inclusiveness; and [iii] Strengthening and maintaining orderliness and resilience.

The ACMF aims to achieve these strategic objectives in two phases over a 10-year period .To cover the first phase, the ACMF has developed the ACMF Action Plan 2016-2020 in collaboration with the industry, market practitioners and other stakeholders. Six key priorities have been identified with specific initiatives which are as follows.

1: Improve regional market infrastructure and connectivity

2: Drive more cohesiveness in regulations and practices

3: Promote ASEAN asset classes

4: Foster better mobility for professionals

5: Attract greater investor participation

6: Promote greater stakeholder interaction, co-operation and co-ordination

The vision of Asian Economic Community 2025 prepared the following action plans for financial integration 2016-2025 viz,[i] greater role of qualified ASEAN banks,[ii] more integrated financial services sector,[iii]interconnected ASEAN stock market,[iv]deep and liquid capital market,[v]improve access to capital markets,[vi] greater private sector engagement,[vii] facilitate cross border collective investment scheme,[viii] substantial liberalization of capital account,[ix] achieve financial inclusion target,[x] promote retail access to bond markets,[xi]improvements in consumer welfare,[xii] greater coherence of banking regulations to support integration,[xiii]greater regional strength on banking sector,[xiv] promote financial stability coordination,[xv] maintain financial stability and deepen bond markets,and [xvi] convergence of prudential regulation. (ASEAN Secretariate, 2015 and AEC Blueprint 2025).

Majeed and Masih (2016) examined Monthly data of stock index prices of Malaysia, Singapore, Thailand, Indonesia, Philippines, US and Japan from 2005 to 2016 using ARDL approach for their long run theoretical relationship and it is found that the ASEAN-5 market indices are co-integrated with each other and with US and Japan. The pattern of responses based on Impulse Response Function further validate that these markets are cointegrated as they move in similar direction in the long-run. Stock market integration is thus an important component of overall economic integration and might be a useful precondition for monetary unification.In the ECM, the error correction terms are negative and significant at 5% level which indicated high rate of convergence to equilibrium.The Chinn-Ito Index (2006) quantify the level of openness of capital accounts for a given country where ASEAN members performed well and the values range between (2,37) for Singapore,(1,16) for Cambodia,(0,02) for Philippines, (-0,13) for Vietnam, Malaysia, Indonesia, (-1,19) for Laos, Thailand and (-1,9) for Myanmar in 2015.

The qualitative assessments of impact of financial integration on macroeconomic parameters of ASEAN in 2015 are given the following Table where ASEAN is benefited well from deeper financial integration.

Table 25: Six Criterion of financial integration in ASEAN

Indicators	*Index of ASEAN*
General level of development	+
Foreign trade openness	++
Mutual trade	-
Quality of macroeconomic policy	++
Financial depth	+
Financial openness	+

Source: Vinokurov(2017)

Despite the progress, the integration of capital markets of ASEAN still depends on the speed with which the various obstacles of capital mobility are removed. Unfortunately, as shown in Table 26, those obstacles still exist. Compared to 2008, and based on the global rankings, the quality of the regulatory framework of ASEAN capital markets, on average, has deteriorated over the last eight years. Many ASEAN countries have continued to perform poorly in the regulation of securities exchanges. Interestingly, ASEAN's ranking in venture capital availability has improved substantially, with all countries moving up the ranks. However, there's still a need to look at the removal of legal impediments to facilitate the integration of capital markets. As of 2016, ASEAN's overall ranking in protecting the legal rights of investors has slipped further, and has noticeably deteriorated in many ASEAN countries.

Table 26: ASEAN Capital Market Rankings 2008-2016

	Legal Right Index		*Venture Capital Ability*		*Regulation of Security Exchanges*	
	2008	*2016*	*2008*	*2016*	*2008*	*2016*
Brunei	29	86	78	61	101	73
Cambodia	128	4	95	66	130	117
Indonesia	52	68	41	20	37	60
Malaysia	8	28	18	6	32	30
Philippines	93	97	77	65	66	40
Singapore	3	20	12	3	7	1
Thailand	52	97	53	31	36	45
Vietnam	29	28	59	43	81	102
Lao PDR	-	46	-	63	-	104
ASEAN average	49.25	52.67	54.13	39.78	61.25	63.56

Source: Global Competitive Report(GCR),WEF: 2008, 2016

ASEAN government bond traction size reached top in 2012 and 2013 and then started to decline where performance of Philippines is poor except Vietnam whose returns are increasing.

Table 27: Accepted Local Currency Government Bond Transaction
Size–On the Run ($million)

Market	2009	2010	2011	2012	2013	2014	2015	2016
Indonesia	1.49	1.91	2.04	1.84	2.05	1.61	0.91	1.72
Malaysia	1.45	1.99	3.66	10.04	4.76	4.57	4.10	4.27
Philippines	1.10	4.48	3.70	3.03	1.40	1.58	1.07	1.81
Singapore	3.45	8.61	18.30	7.92	6.19	5.29	3.52	5.50
Thailand	1.58	1.86	1.73	4.65	1.92	1.91	1.92	3.79
Vietnam	2.68	2.26	3.0	2.39	3.16	3.30	2.22	3.36

Source: Asian Development Bank

Following AEC Blueprint 2015, ASEAN made framework of payment and settlement system (PSS) development by focusing on five key elements: (i) policy, (ii) legal framework, (iii) instrument,(iv) institution, and (v) infrastructure. The studies were conducted on five specific areas of PSS to determine areas for future enhancement, development, and harmonization.The five areas were (i) cross border trade settlement, (ii) cross border money remittance, (iii) cross border retail payment systems, (iv) cross border capital market settlement, and (v) standardization.ASEAN targeted capital account liberalization which promotes financial sector development, as well as capital market development, by increasing the volume of gross cross border capital flows by lowering transaction costs which is a critical element of deeper and more liquid national and regional markets. Capital account liberalization facilitates the integration of ASEAN banking markets and entails risks, especially given the volatile nature of global capital flows although it must contain (i) Macroeconomic risks (ii) Financial stability risk. (iii) Risk of capital flow reversal. In brief, if ASEAN adopts single currency then capital market needs to be more developed to implement above policies with stable macro fundamentals so that OCA criterion is fully feasible.

VII. Shortcomings and the future research

The paper should focus more on Agreements on regional trade arrangement, customs union, rules of origin by which trade integration depend upon. Why the growth rates of intra import share and openness have been declining should be find out. Monetary integration of ASEAN is confronting with absence of regional central bank, regional stock exchange and a common planning board which can promote to realize a common currency for ASEAN .But ASEAN+3 is the barrier of establishment of a single currency where Chiang Mai initiative turns in the central goal towards the process of RECP and Asian Monetary Fund. Moreover,there are asymmetric shocks from GDP,GDP per capita, interest rate, exchange rate, external debt, fiscal deficit and current account balance and even there is symmetric shock in inflation rate which are not calculated through econometric models. Even there is a gap and imbalance among two groups of countries: one group consists of Singapore, Malaysia,

Thailand, Philippines, Indonesia and the second group consists of Loas, Cambodia, Myanmar and Vietnam. This imbalance hampers equitable distribution, macroeconomic development and balanced growth of capital market which directly or indirectly hamper the process of trade and monetary integration in ASEAN. All these important areas of studies are left for future research.

VIII. Conclusions and remarks

The paper concludes that towards the progress of trade integration in ASEAN during 1990-2017, intra export and intra import share of the bloc, world export and import share of the bloc and even export and import have been growing increasingly showing structural breaks upwards.Their forecast values in 2030 are also encouraging. The intra export share is positively related with GDP, FDI, and negatively related with openness and REER during 1990-2017 where the nexus between openness –intraexport share is unfavourable. Similarly, intraimport share is positively related with GDP,FDI,openness and negatively related with REER. There are two cointegrating equations among intra export share, GDP, FDI, openness REER, and inflation but there are three cointegrating equations among intra import share, GDP, FDI, openness, REER and inflation during 1990-2017. Insignificant long run causalities have been found from GDP, FDI, openness, REER, and inflation to intra export share but significant long run causalities have been found from GDP, openness, REER and inflation to intra import share during the same period. There are significant short run causalities from openness and inflation to FDI and from openness to inflation rate in ASEAN during the survey period. The optimum currency area criterion were not fulfilled in case of Beta and Sigma convergence hypothesis where both the convergence hypothesis were satisfied in fiscal deficit as per cent of GDP,external debt as per cent of GDP and Sigma convergence was satisfied in inflation rate but both the convergence hypothesis were not satisfied in interest rate and exchange rate with US$ during the period from 1990 to 2017 respectively. Thus the implementation of a single currency in ASEAN is not ripe just now. However,the structures of share market,bond market ,equity market and capital account convertibility are not matured enough to have a single currency in ASEAN.

References

Alesina, A., Barro, R., & Tenreyro, S., (2002). 'Optimum Currency Unions', National Bureau of Economic Research, Retrieved from *www.nber.org/chapters/c11077.pdf*

National Bureau of Economic Research. Retrieved from *http://www.nber.org/chapters/ c11077.pdf*

Alessina, A., Barro, R., & Tenreyro, S. (2002). Optimal Currency Unions.

National Bureau of Economic Research. Retrieved from *http://www.nber.org/chapters/ c11077.pdf*

Alessina, A., Barro, R., & Tenreyro, S. (2002). Optimal Currency Unions. National Bureau of Economic Research. Retrieved from *http://www.nber.org/chapters/c11077.*

Andrista, Safira., & Widodo, Tri., (2017). 'Welfare Impact of ASEAN Economic Integration: "ASEAN Way" Versus Theory',MPRA Paper No-80880, *https:// mpra.ub.uni-muenchen.de / 80880/*

Appleyard, D. R., Alfred J. Field, J., & Cobb, S. L., (2008). International Economics. Singapore: McGraw Hill Irwin.

ASEAN Secretariat., (2017). A Journey Towards Regional Economic Integration: 1967-2017. Jakarta: ASEAN Secretariat, August 2017www.asean.org

ASEAN Economic Integration Brief., (2017). No-1. Retrieved from *https://asean.org/ storage/ 2017/06/AEIB_No.01-June-2017_rev.pdf.*

Bacha,Obiyathulla Ismath., (2011). 'A common currency area for ASEAN? issues and feasibility', *https://doi.org/10.1080/00036840600675653*

Bai, Jushan., & Perron, P., (2003). 'Critical values for Multiple Structural Change Tests', Econometrics Journal, 6, 72-78.

Balassa, B., (1961). The Theory of Economic Integration. London: Allen & Unwin.

Bayoumi, T., (1994). 'A Formal Model of Optimum Currency Areas', IMF Staff Papers No. 41, International Economies.

Bayoumi, T., & Mauro, P., (1999). 'The Suitability of ASEAN for a Regional Currency Arrangement', IMF, WP/99/162.

Bayoumi, T., & Eichengreen, B., (1994). 'One Money or Many? Analysing the Prospects for Monetary Unification in Various Parts of the World', Princeton Studies in International Finance, No.76.

Cadot, Oliver., & Ing, Lili Yan., (2015). 'Non-tariff Measures and Harmonisation : Issues for the RCEP', *http://www.eria.org/ERIA-DP-2015-61.pdf.*

Chinn, Menzie D.& Ito, H., (2006). 'What Matters for Financial Development? Capital Controls, Institutions, and Interactions', *Journal of Development Economics*, 81(1),163-192.

Chow, H.K., & Kim, Y., (2003). 'A Common Currency Peg in East Asia? Perspectives from Western Europe', *Journal of Macroeconomics*, 25, 331-350.

Cochrane, D., & Orcutt, G. H., (1949). 'Application of Least Squares Regression to Relationships Containing Auto-Correlated Error Terms', *Journal of the American Statistical Association,* 44(245),32–61. doi:10.1080/01621459.1949.10483290.

Crowley, P. M., (2006). 'Is There a logical Integration Sequence After EMU?', *Journal of Economic Integration*, 21(1), 1-20.

Fleming. J. Marcus., (1971). 'On Exchange Rate Unification', *The Economic Journal*, 81, 467-88.

Gharleghi, Behrooz., Shafighi, Najla., & Yin Fah, Benjamin Chan., (2015). 'Financial Integration and Common Currency Area in ASEAN',Journal of Economics, Business and Management, 3(1),111-114, *http://www.joebm.com/papers/164-W10056.pdf*

Guerrero, Rosabel B., (2008). 'Regional integration: the ASEAN vision in 2020', IFC Bulletin No 32,52-58, *https://www.bis.org/ifc/publ/ifcb32c.pdf*

Haberler, Gottfried., (1970). 'The International Monetary System: Some recent Developments and Discussions', In George Halm(Ed). Approaches to Greater Flexibility in Exchange Rates. Princeton University Press, pp. 115-23.

Hill, C. W., Wee, C.-H., & Udayasankar, K., (2012). International Business : AnAsian Perspective. Singapore: McGraw Hill.

Johansen, S., (1988). 'Statistical Analysis of Cointegrating Vectors', *Journal of Economic Dynamics and Control*, 12, 231-254.

Kentaro, Kawasaki., (2012). 'Are the "ASEAN Plus Three" Countries Coming Closer to an OCA?', RIETI Discussion Paper Series 12-E-032.

Kenen P., (1969). The Theory of Optimum Currency Areas: An Eclectic View. Monetary Problems of the International Economy. Chicago: University of Chicago Press.

Krugman, P. R., & Obstfeld, M. (2003). International economics: Theory and policy (6th ed.). Boston, MA: Addison Wesley.

Krugman, P. R., & Obstfeld. M., (2003). International Economics:Theory and Policy(6th ed.). Boston. M.A.: Addison Wesley.

Li, C.,& Whalley, J., (2014. 'China and the Trans-Pacific Partnership: A Numerical Simulation Assessment of the Effects Involved', *World Economy*, 37 (2): 169-92.

Li, C., & Whalley, J., (2016). 'How close is Asia already to being a trace bloc?', *Journal of Comparative Economics*, (8), 1-18.

Madalla, E., & Balboa, J., (2009). 'Regional Economic Integration in East Asia: Progress and Pathways', PIDS Discussion Paper Series No-2011-23. *https://www.academia.edu/ 32580900/Regional_Economic_Integration_in_East_Asia_Progress_and_Pathways.*

Majeed, Ayesha., & Masih, Mansur., (2016). 'A study of long- run the oretical relationship between ASEAN stock market indices and developed stock market indices of US and Japan', MPRA Paper No-79724. *https://mpra.ub.uni-muenchen.de/79724/*

McKinnon R., (1963). 'Optimum Currency Areas', *American Economic Review,* 53.

Mohseni, RezaMoosavi., & Azali, M., (2014). 'Monetary Integration and Optimum Currency Area in ASEAN+3:What We Need for a New Framework?', *International Journal of Economics and Financial Issues*, 4(2), 277-285.

Mundell, R. A., (1961). 'A Theory of Optimum Currency Areas', *The American Economic Review,* 51(4), 657-665.

NTS Bulletin., (2017). 'Way forward for trade integration in addressing poverty in ASEAN', *www.rsis.edu.sg/research/nts-centre*

Ng, T. H., (2002). 'Should the Southeast Asian Countries Form a Currency Union?', The Developing Economies, 40(2), 113-134.

Pangestu, Mari., & Ing, Lili Yan., (2017). 'ASEAN: Regional Integration and Reforms', Policy Brief No-2017-05, *www.eria.org*

Rillo, Aladdin D., (2018). 'Asian Financial Integration: Opportunities, Risks, and Challenges', Public Policy Review, 14(5), 901-925.

Sala-i-Martin, Xavier., (1996). 'The Classical Approach to Convergence Analysis', Economic Journal, 106(437), 1019-1036. Retrieved from *https://econpapers.repec.org/ RePEc:ecj:econjl:v:106:y:1996:i:437:p:1019-36.*

Sima,Biondi S., (2015). 'Can The ASEAN Regional Integration Lead To A Single Currency In SouthEast Asia?', *Journal Hubungan Internasional*, **1(2),** *http://journal.unhas.ac.id/ index.php/ wanua/article/view/4775*

Thong, Song Kuok., Santhapparaj, A.S., & Hossain, Sayed., (2010). 'Feasibility of a Single Currency for theASEAN-5', *International Journal of Business and Accountancy*, 1(1),*47- 62.*

Tran, Ly Nguyen Huong., (2018). 'An economic analysis of the feasibility of a potential ASEAN single currency: Exchange rate integration - A VAR Approach',Aalto University.

Viner, J., (1950). The Custom Union Issue. New York: Carnegie Endowment for International Peace.

Vinokurov, Evgeny., (2017). 'Regional Financial Integration in ASEAN in the comparative perspective', MPRA Paper No-83022, Eurasian Development Bank.

Wald, Abraham., (1943). 'Test of Statistical Hypothesis concerning several parameters when the number of observations is large', Transactions of American Mathematical Society, 54, 426-82.