Vidyasagar University Journal of Commerce
Vol. 22, 2017/ISSN 0973-5917

GDP GROWTH RATE AND TEA EXPORT IN INDIA: COINTEGRATION AND VECTOR AUTOREGRESSION ANALYSIS

DebeshBhowmik*
DebasishBiswas**
SubhajitPahari***

Abstract

Tea, only because of its ability to twist our mood and make us feel refreshed, in the world it has become the second most consumed beverages next to water leaving behind coffee, soda and others;on the other hand India has become the second largest tea producer and fourth largest tea exporter in the world owing to its strong geographical indications, heavy investments in tea processing units, continuous innovation, augmented product mix and strategic market expansion. In this present juncture, the researchers has made a deliberate attempt in this paper to establish the behaviour of Indian tea exports during the period 1951-52 to 2013-14 and to find out the nexus between Indian tea export and GDP growth rate showing co-integration, causality, Vector Auto regression, and Vector Error Correction during the study period and also to prescribe some policies relating to export management of tea.

Key Words: tea export, GDP growth rate, co-integration, causality, VAR, VECM

I. Introduction

India has been playing dominant role in global tea trade since few decades. India is now the second largest tea producer in the world only next to China, leaving behind Kenya, Indonesia and Sri Lanka. Not only that, despite of fluctuating share in world exports, India is one of the key sources for tea as well as providing one of the largest markets. Indian tea export occupies an important place to step up GDP significantly. India produces about 30% of world tea and exports about 13.35% in the world market. If we give a look to the recent data, we will be able to understand the level of contribution of tea export on GDP in our country. In 2015-2016, Tea exports from India stood at 232.92 million kg, valued at US$ 686.67 million. During 2016, major importers of Indian tea were Russia, United States, United Kingdom, Egypt, Iran, Saudi Arabia, Germany, Morocco, Japan, France, UAE, Canada, Vietnam,

* Associated with The Indian Econometric Society, Email-debeshbhowmik@rediffmail.com
** Assistant Professor, Department of Business Administration, Vidyasagar University, Midnapore Email-debasish762010@yahoo.com
***Research Scholar, Department of Business Administration, Vidyasagar University, Midnapore Email-paharisubhajit@gmail.com

Netherlands, and Kazakhstan. Not only that, in only the first four months of 2017 export of Indian teas increased by 5.7 per cent.

India can take advantage from the world's excess demand for tea amounting to 87 million Kg. India has a long historical background of tea production and export since British imperial period which is to be nourished carefully in the multilateral trading regimes to take the export of the to the next level. In this liberalized economic environment, institutional arrangements and State intervention move towards removal of tariff barriers. So the survival depends on maintaining export competitiveness. This focus on attaining export competitiveness intensified in the new liberal trade environment following formation of WTO and signing of various multilateral trade agreements. Thus it became imperative for the Indian tea industry to be price competitive both in domestic and foreign markets.

Therefore, this paper brings into light- the nature of tea exports and also tries to find nexus between tea export and growth rates of GDP in India during 1951-52 to 2013-14.Based on this result, some policies has been prescribed for the betterment of India's tea export in future.

II. Literature Review

There are many economic literatures in which export and import induced GDP growth rate but a few of them have been done on the nexus between tea export and GDP growth rate in India. For the purpose of keeping the discussion limited, few recent literatures are discussed below:

Liu and Shao(2016) examined India's weekly tea auction price in the year 2013 to 2014 and tested for stability, autocorrelation and partial correlation test, and the ARMA (1, 1) model to predict the tea price of the last week in 2014 and the tea price of the first two weeks in 2015, and found the prediction error is small. Therefore, their paper suggests that a mature tea auction market should be established in China which is a big exporter of tea production, and China should set an early warning mechanism for the price of tea, and use the price information to guide the production of tea cultivation and sales activities.

Mithamia and Muturi(2015) studied that there is a direct relationship with tea export earnings, real exchange rate, tea price, exports of goods and services and agricultural value addition using cointegration and VAR models in Kenya during 1980-2011.

Alkheteab and Sultan (2015) found that there exists a long run cointegration relationship between agricultural export of India and REER, demand for agricultural products, agricultural production and India's per capita income which Granger cause agricultural exports in the short run as well as in the long run.

Maity and Ghosh (2015) verified policy changes in the relationship between tea export and trade openness during 1992-93-2011-12 in India using Phillips Perron Non –Parametric

Test.

Saravanakumar&Chinnasamy(2013) fitted linear trend line of import of tea from India which showed positive and significant during 2001-2011 and also prescribed some policies to boost tea imports from India.

NathSamantaray and Kumar (2012) considers the exports and production status of the tea industry in India from 1950 to 2006 by taking the data like annual exports and production of tea from 1950-2006, monthly production according to the region from 1992-2006 and monthly auction price according to the region of production from 1992-2006.It was observed that India's export in terms of its percentage of production is decreasing. The weak correlation between production and exports of tea makes to believe that India could not able to export more quantity tea that it produces. It shows only 5.4% of the variation in exports is explained by production. This also shows that the auction price is somewhat dependent on the amount of production. In order to gain the competitive advantage, Indian tea industry needs improvement in research facility, introduction of modern technology etc.

CUTS (2011) conducted a case study on the tea sector, in Jalpaiguri and Darjeeling districts of West Bengal explored the export-oriented value chain in the sector and showed how various stakeholders are interrelated. The study investigates into whether export of tea has increased (or not) after introduction of the Foreign Trade Policy of India; what has been the impact on various stakeholders; what are the bottlenecks for exporting tea; and what could be the probable measures that will help in improving the export scenario.

III. Objectives of the Study

Followings are the thrust area of the study:

i. To establish the behaviour of Indian tea exports during the period 1951-52 to 2013-14.

ii. To find out the nexus between Indian tea export and GDP growth rate.

IV. Methodology

To explain the behavior of Indian tea export during 1951-52-2013-14,semi- log linear trend,exponential trend,random walk with drift,Bai-Perron(2003) structural breaks,and HodrickPrescott Fiulter(1997) models have been applied.ARIMA(1,1,1) model is used for stationarity and GARCH(1,1) model is used for volatility.

To relate Indian tea export and GDP growth rate double log linear models have been used. Granger model (1969) was used to show causality between growth and tea export. Residual tests for serial correlation, heteroscedasticity and normality were also done. Johansen cointegration and VAR models (1991,1996) have been used to show the relationship between tea export and GDP growth rate in India during 1951-52 to 2013-14.Unit root circle test, impulse response functions, Doornik Hansen normality test were also conducted. VEC model was also used to show the character and speed of error correction process.VEC model with two period lag was applied to get faster error correction process.In both the cases, the residual tests have been conducted. The data of tea export in India during the specified period were collected from Tea Board of India and GDP growth rates were collected from the Planning Commission of India.

V. Analysis &Observations from the Econometric Models:

The estimates of semi-log linear model showed that tea export in India has been increasing at the rate of 6.43% per year during 1951-52-2013-14 which is significant at 5% level.

$$\text{Log}(x) = 13.35603 + 0.06436t$$

$$(191.942)^{*}(34.0427)^{*}$$

R^2=0.9499, F=1158.908, DW=0.501, x=tea exports of India (in '000 Rupees,) t-time, *=significant at 5% level.

In Fig.-1, the estimated linear trend line is shown by green line and the actual line is plotted by red line and the residual line is shown by blue line.

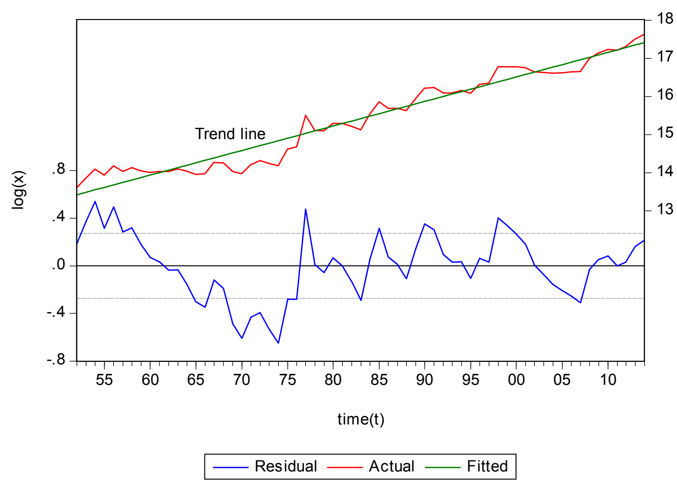


Fig-1: Linear trend line

Source-Computed by author

On the other hand, the GDP growth rate of India has been increasing at the rate of 3.69% per year during the period which is significant with low R^2 whose estimated regression is shown below.

$$\text{Log}(g) = -0.20608 + 0.036961t$$
$$(-0.36353)\ (2.3997)^*$$

R^2=0.086, F=5.758*, DW=2.011 where g=growth rate of GDP of India, *=significant at 5%

ARIMA (1,1,1) model claims that tea export series is stationary where both AR(1) and MA(1) are convergent since they are less than one and the t values of the coefficients are significant at 10% level. The estimated model is as follows.

$$\text{Log}(x_t) = 413.1649 + 0.99984\log(x_{t-1}) + \varepsilon_t - 0.215876\varepsilon_{t-1}$$
$$(0.00988)\ (59.3026)^* \qquad (-1.67367)^*$$

R^2=0.974, F=1139.333*, DW=1.9049, AR root=1, MA root=0.22, *significant at 10%

The stability of the model is verified by the unit root circle where both lie in the circle.

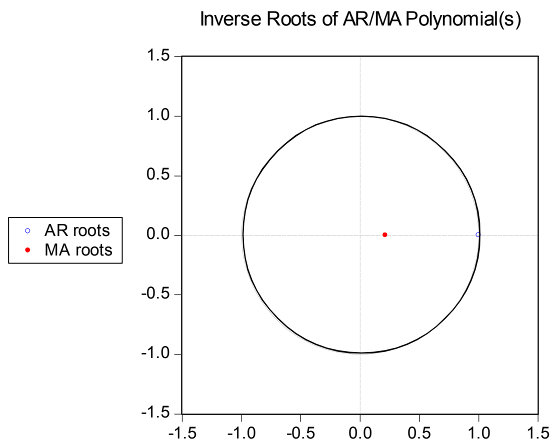


Fig-2: Stability of ARIMA of tea export of India

Source-Computed by author

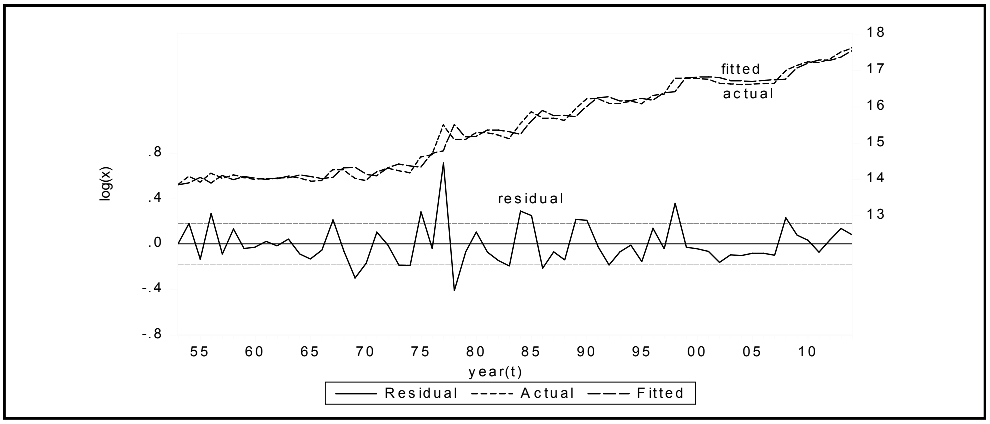
The non-linear trend line of Indian tea exports from 1951-52 to 2013-14 has been fitted by exponential series which is significant at 5% level because its t values of all coefficients are significant. The estimated trend line is given below.

$$\log(x) = e^{1.2282 + t^{0.1179 + ut}}$$

$$U_t = 0.86706u_{t-1}$$
$$(25.57)$$

Where R^2=0.977, DW=2.319, Inverted AR root=0.87, t values of 1.2282 and 0.1179 are 12.21 and 7.06 and t values of 0.86706 is 25.57, all of which are significant.It is convergent,stable and stationary.The actual and fitted non linear trends are plotted in Fig-3.

Fig-3: Non-linear fitted trend line



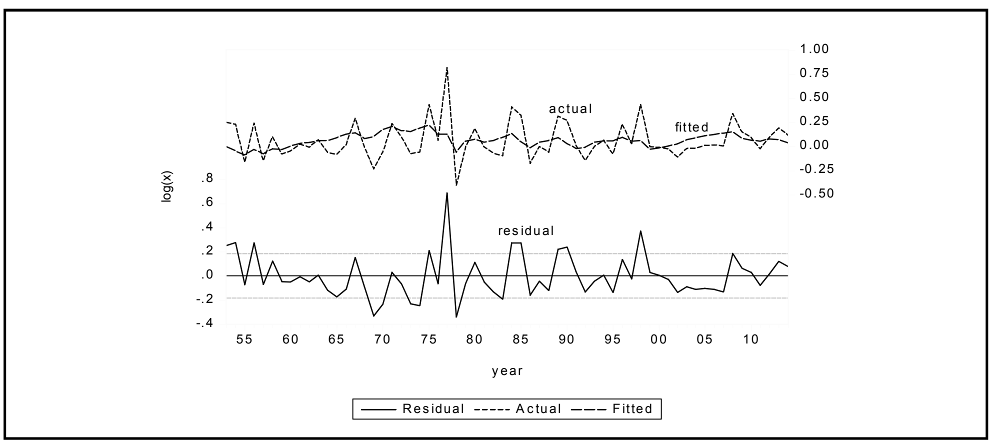
The tea exports in India during 1951-52 to 2013-14 follows random walk with drift process which have been estimated in the following model.

$$Dlog(x_t)=3.384633-0.251161log(x_{t-1})+0.016709t$$
$$(2.9374)^* \quad (-2.901)^* \qquad (2.935)^*$$

R^2=0.127, F=4.32*, DW=2.02,*=significant at 5% level

In Fig- 4, the randomness and drift are clearly verified from the fitted and actual lines.

India's tea exports during 1951-52 to 2013-14 showed three structural breaks in 1975,1985



Source-Computed by author

and 1998 respectively which are computed by Bai-Perron(2003) test and was found significant at 5% level and sequential F statistic of break test are significant for those three breaks.HAC standard errors and covariance (Bartlett Kernel,Newey-West fixed bandwidth=3.0, Trimming 0.15) technique was applied.

Table-1: Structural breaks

Variable	Coefficient	Std. Error	t-Statistic	Prob.
		1952-1974 -- 23 obs		
C	14.06347	0.040592	346.4553	0.0000
		1975 - 1984 -- 10 obs		
C	15.14658	0.094742	159.8719	0.0000
		1985 - 1997 -- 13 obs		
C	16.02536	0.104361	153.5573	0.0000
		1998 - 2014 -- 17 obs		
C	16.93673	0.141572	119.6332	0.0000
		R^2=0.957,F=439.61*		
	Sequential F-statistic determined breaks:	3		
Break Test	F-statistic	Scaled F-statistic	Critical Value**	
0 vs. 1 *	71.62121	71.62121	8.58	
1 vs. 2 *	92.55945	92.55945	10.13	
2 vs. 3 *	26.68136	26.68136	11.14	
3 vs. 4	8.843962	8.843962	11.83	

* Significant at the 0.05 level, ** Bai-Perron (Econometric Journal, 2003) critical values.

In Fig- 5, all the structural breaks with fitted lines have been plotted clearly.

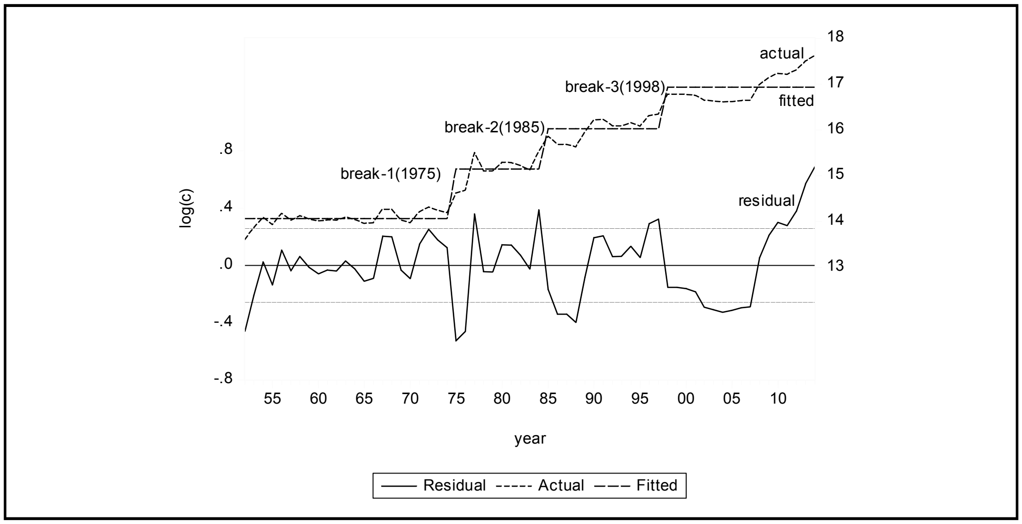


Fig- 5: Structural breaks

Source-Computed by author

The smooth non-linear trend can be obtained by applying Hodrick-Prescott Filter model by which cyclical patterns are minimized.Thus, we found the clear cyclical trend line of the Indian tea exports during 1951-52 to 2014-15.

In Fig-6, the smooth trend line is plotted below

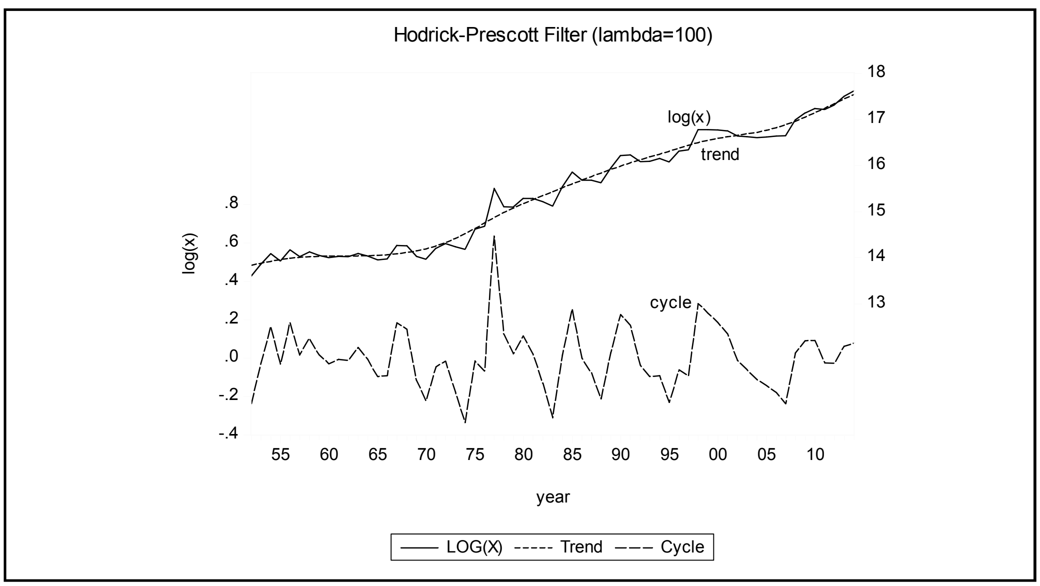


Fig- 6 : HPFilter model

Source-Computed by author

The log variable of tea export in India during 1951-52 to 2013-14 was observed as too much volatile which was verified by GARCH(1,1) model .In the model the null hypothesis is rejected since z statistics of α and β are insignificant even R^2 is spurious with low SC and AIC.It is also non-stationary because $\alpha+\beta>1$.

$$\sigma_t^2=-33.6388+1.68829\varepsilon_{t-1}^2-0.4865\sigma_{t-1}^2$$
$$(-0.00255)\ (0.0166)\quad (-0.00549)$$

R^2=-164.82, SC=8.50, AIC=8.39, DW=0.000169

The variability was shown by conditional variance given below.

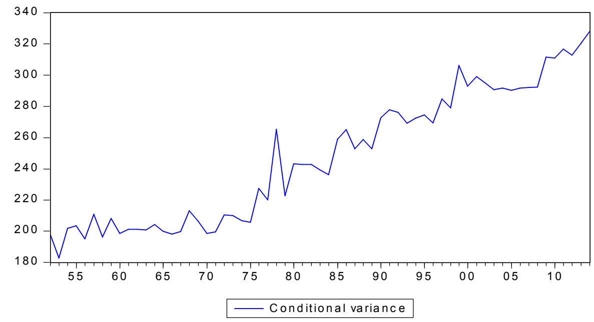


Fig-7: Conditional variance of log(x)

Source-Computed by author

On the other hand, India's GDP growth increases at the rate 3.69% per year during 1951-52 to 2013-14 which is significant at 5% level although R^2 is very low.

$$\text{Log}(g)=-0.20608+0.0369t$$
$$(-0.3635)\quad (2.399)^*$$

R^2=0.086, F=5.758*, DW=2.011, g=GDP growth rate, *=significant at 5% level

This estimated trend line of growth rate of GDP is shown in Fig-8.

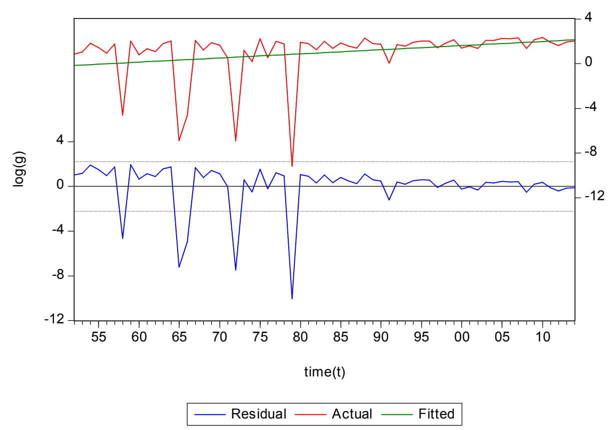


Fig-8: Trend line of growth rate of GDP

Source-Computed by author

The double log linear model states that one percent increase in exports of tea per year in India led to 0.6255% increase in GDP growth rate per year during 1951-52 to 2013-14 which is significant. The estimated line is shown below.

Log(g)= -8.66672+0.6255log(x)

(-2.4318)* (2.714)*

R^2=0.1077, F=7.366*, DW=2.04, *=significant at 5% level.

In Fig-9, the estimated trend line is shown by the green line.

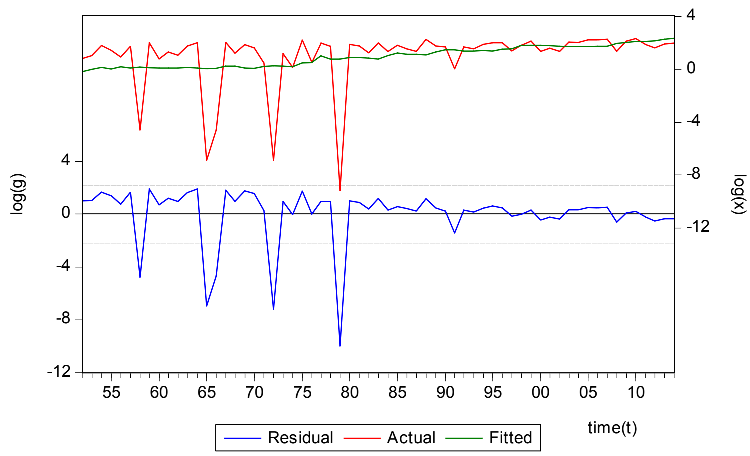


Fig-9: Relationship between GDP growth and tea export

Source-Computed by author

The relationship between Indian tea export and GDP growth rate is non-linear which is estimated as below and found statistically significant.

$$\log(g) = e^{-2.70836 + x^{0.13346 + ut}}$$

Where U_t=-0.20523U_{t-1} – 0.10253U_{t-2}

(-1.550) (-0.778)

R^2=0.251043, F=0.3686*, DW=1.99, AR roots = -0.10±30i, t values of C(1)=-2.576* and C(2)=16.22* are significant.

This estimated equation is plotted in the Fig-10 below where green line is the estimated trend line.

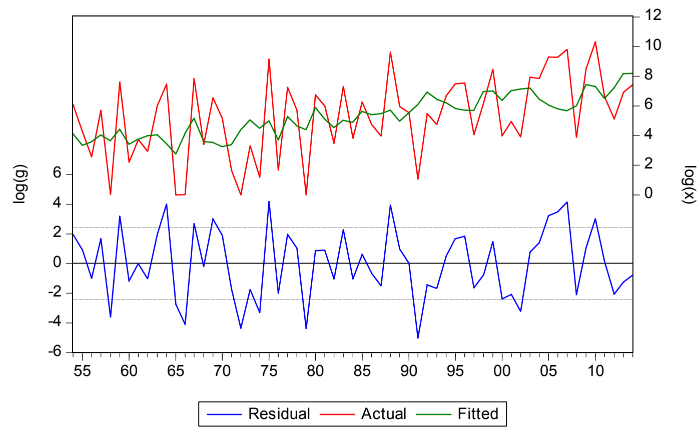


Fig-10: Non-linear relation

Source-Computed by author

The Breusch –Godfrey residual test for serial correlation LM test asserts that it has serial correlation problem since nR^2=1.481987 whose Chi-Square value is 0.4766 which is not significant.

Even, it has ARCH error because residual heteroscedasticity test proved that nR^2=0.03497 whose Chi-Square value is 0.85 and F=0.0338 both which are insignificant .The estimated equation is given below.

$$\varepsilon_t^2 = 4.6186 + 0.023757\varepsilon_{t-1}^2$$
$$(2.219)^* \quad (0.1840)$$

R^2=0.00056, F=0.0338, DW=1.99, *=significant

Granger causality test assures that Indian tea export and GDP growth rate during 1951-52 To 2013-14 have uni-directional causality as shown below where H0= rejection of the hypothesis.

Table-2: Causality test, Lag-1

Null Hypothesis:	Obs	F-Statistic	Prob.
X does not Granger Cause G	62	13.5046	0.0005
G does not Granger Cause X		0.31262	0.5782

Source-Computed by author

Moreover, Johansen cointegration test showed that both Trace statistic and Max Eigen Statistic have two cointegrating equations and they are cointegrated in the order of C(1).

In Table-3,it is shown in details.

Table-3:Cointegration test

Hypothesized		Trace	0.05	
No. of CE(s)	Eigen value	Statistic	Critical Value	Prob.**
None *	0.301996	28.97620	15.49471	0.0003
At most 1 *	0.116095	7.404342	3.841466	0.0065
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigen value	Statistic	Critical Value	Prob.**
None *	0.301996	21.57186	14.26460	0.0030
At most 1 *	0.116095	7.404342	3.841466	0.0065

Source-Computed by author, ***=rejection of null hypothesis**

The estimated VAR model using lag1 is given below through equations.

$LogG_t$=-9.0239-0.028456$logG_{t-1}$+0.65215$logX_{t-1}$
(-2.31)* (-0.2182) (2.5559)*

R^2=0.1053, F=3.475, SC=4.59, AIC=4.49

$LogX_t$=0.08405-0.004498$logG_{t-1}$+0.99903$logX_{t-1}$
(0.2459) (-0.3933) (44.639)*

R^2=0.974,F=1107.30*,SC=-0.2695,AIC=-0.3724

This VAR model is stable because two roots lie inside the unit root circle which is shown in Fig-11. The values of the two roots are (0.99616,-0.02559).

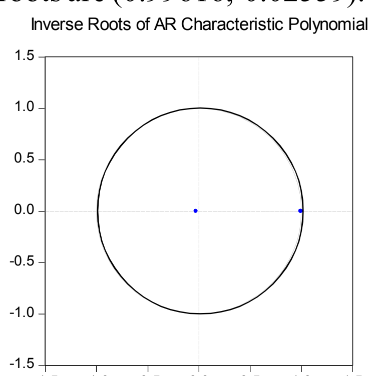


Fig-11: Stable VAR model

Source-Computed by author

Any exogenous shock would not bring this VAR model back into equilibrium so that it is divergent which is proved by the Impulse Response Functions which do not tend to zero. In Fig-12, impulse response functions are given.

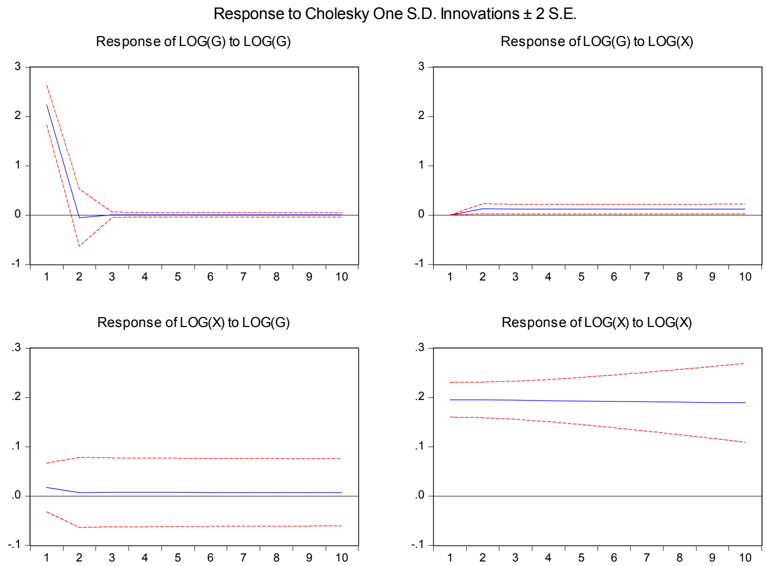


Fig-12: Impulse Response Functions

Source-Computed by author

Doornik-Hansen VAR residual normality test confirmed that component 2 of kurtosis is not significantly distributed but all other components are significant, so that residuals are not normally distributed.

Table-4: Normality test

Component	Skewness	Chi-sq	df	Prob.
1	-2.876161	37.87082	1	0.0000
2	1.046144	10.19914	1	0.0014
Joint		48.06996	2	0.0000
Component	Kurtosis	Chi-sq	df	Prob.
1	11.42696	147.8118	1	0.0000
2	5.566278	0.746431	1	0.3876
Joint		148.5582	2	0.0000
Component	Jarque-Bera	df	Prob.	
1	185.6826	2	0.0000	
2	10.94557	2	0.0042	
Joint	196.6281	4	0.0000	

Source-Computed by author

The estimated VEC Model confirmed that the error corrections of both the changes of tea export and GDP growth rate are significant at 10% level but the speed is very low. The t values of the coefficients of the first equation are significant.

$\Delta logX_t$=514923.3+0.347493$\Delta logX_{t-1}$-218981.6$\Delta logG_{t-1}$-0.0197EC
(2.129)* (2.775)* (-2.389)* (-1.735)*

R^2=0.183, F=4.28, SC=31.82, AIC=31.68,

$\Delta logG_t$=-0.0391+1.78E-07$\Delta logX_{t-1}$-0.0068$\Delta logG_{t-1}$+9.22E-08EC
(-0.1133) (0.9980) (-0.0524) (5.705)*

R^2=0.5658, F=24.46, SC=4.89, AIC=4.76,*significant at 5% level.

Although the VECM is stable as had been proved by the unit root circle test where all roots lie inside the circle. It is shown in Fig-13. The roots are (1.0,-0.079678±0.383448i,-0.025758).

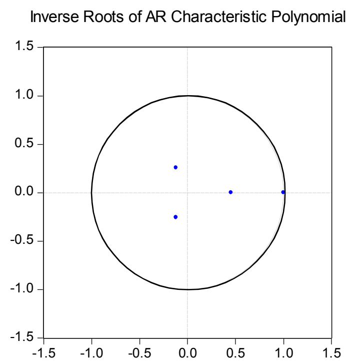


Fig-13: Stable VECM

Source-Computed by author

Using two period lag of VEC model for cointegrating relationship between growth and exports of tea in India during 1951-52 to 2013-14,we have got more speedy error correction process than the one period lag for both Δx_t and ΔG_t.Even the coefficients are significant than before but R^2 is very low in the estimated equation for Δx_t.

Δx_t=504311.6+0.3134Δx_{t-1}+0.088503Δx_{t-2}-317570ΔG_{t-1}-99514.96ΔG_{t-2}-0.033342EC
(1.95)* (2.309)* (0.59) (-2.11)* (-0.98) (-1.70)*

R^2=0.19, F=2.53, AIC=31.76, SC=31.97

ΔG_t=0.0649+1.99E-07Δx_{t-1}-3.34E-07Δx_{t-2}+0.0650ΔG_{t-1}+0.0605ΔG_{t-2}+1.22E-07EC
(0.182) (1.05) (-1.62)* (0.31) (0.43) (4.49)*

R^2=0.58, F=15.42*, AIC=4.78, SC=4.99

This VEC model is found stable since all roots (1.0,0.4081±0.3206i,-0.1717±0.3999i,-0.4399) remain in the unit root circle which is shown in Fig-14.

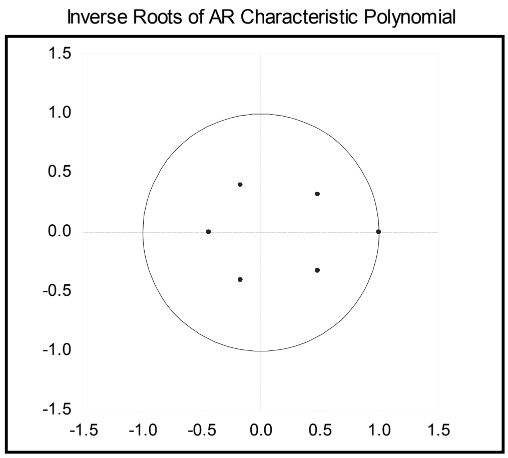


Fig- 14: Stability of VECM

Source-Computed by author

Two period lag VEC model is also diverging which was seen in the Fig-15 ,through impulse response functions.

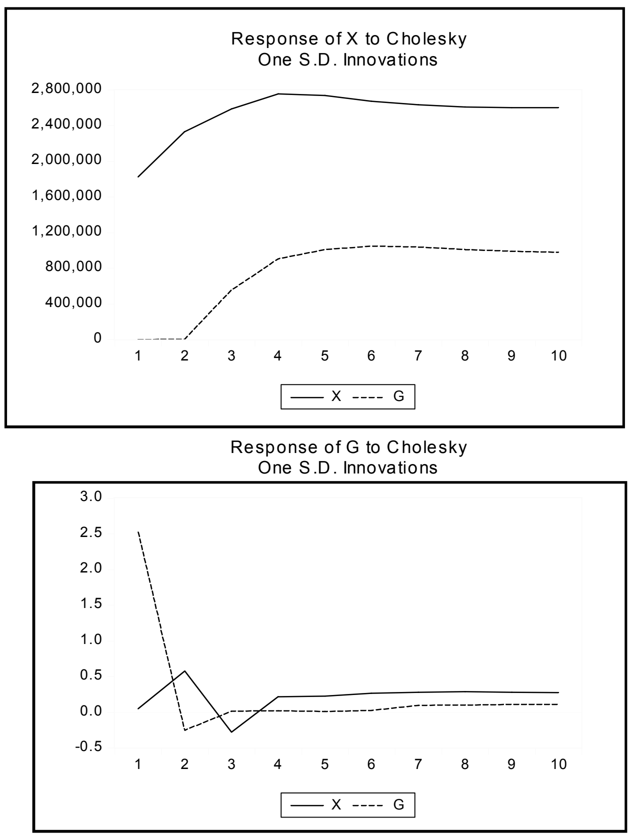


Fig-15: Impulse response functions

Source-Computed by author

Doornik-Hansen VEC residual normality test rejected null hypothesis of residuals are multivariate normal which is explained in the Table- 5, below.

Table-5: VEC residual normality test

Component	Skewness	Chi-sq	df	Prob.
1	1.404971	15.41639	1	0.0001
2	-0.077305	0.072052	1	0.7884
joint		15.48844	2	0.0004
Component	Kurtosis	Chi-sq	df	Prob.
1	5.723730	3.410109	1	0.0648
2	2.303034	0.823466	1	0.3642
joint		4.233575	2	0.1204
Component	Jarque-Bera	df	Prob.	
1	18.82650	2	0.0001	
2	0.895518	2	0.6391	
Joint	19.72201	4	0.0006	

Source-Computed by author

This two period lag VEC model also contains auto correlation problems which was seen in Fig-16.

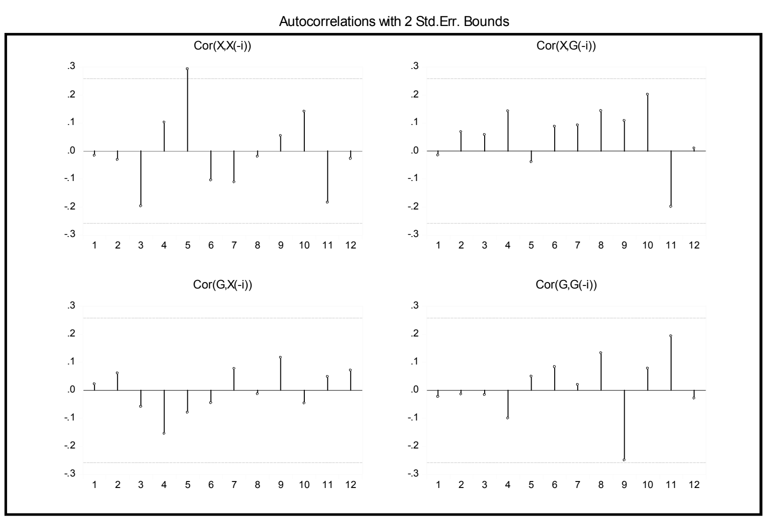


Fig- 16: Problem of autocorrelation

Source-Computed by author

It has also contains serial correlation which was found by VEC residual serial correlation LM test .

Table- 6: Problem of serial correlation

Lags	LM-Stat	Prob
1	3.752772	0.4405
2	5.686213	0.2238
3	7.948514	0.0935
4	4.699360	0.3196
5	8.482066	0.0754
6	2.107047	0.7161
7	2.910235	0.5730
8	2.657785	0.6166
9	8.333023	0.0801
10	4.983575	0.2890
11	9.023130	0.0605
12	0.849332	0.9317

Source-Computed by author

The model of semi-log linear trend line states that Indian tea export significantly increases at the rate of 6.43% per year during the study period of 1951-52 to 2013-14 and exponentially at the rate of 0.1179% per year. It has three structural breaks in 1975, 1985 and 1998 respectively. Its cyclical path is minimized and was found smooth nonlinear trend line. Its ARIMA (1, 1, 1) is stationary. The export series of tea is highly volatile.

Double log linear model between GDP growth rate and tea export showed that one percent increase in tea export of India led to 0.625% increase in GDP growth rate per year significantly during the specified period. The residual tests confirmed that it has serial correlation and ARCH errors. Even they are related exponentially significantly. Granger causality test proved that causality is uni-directional. Johansen co-integration test showed that GDP growth rate and tea export is co-integrated in the order of C (1).The VAR and VEC with lag one and lag two models are stable and divergent which were shown by unit root circle test and impulse response functions respectively. Even residual test confirmed that the residuals are not multivariate normal. VEC model of lag two showed that error correction process is quicker and significant than lag one model.

VI. Limitations and Scope of Future Research

There may be several variables which influence the nexus between GDP growth rate and tea export. Such variables are exchange rate (nominal as well as real),inflation rate, price of tea, price of coffee,trade openness, climate change which should be included in the cointegration and VAR analysis so that broader areas of determinants can be explained and policies would be easy to prescribe and to execute. The causes of volatility of tea export should be explored so that production processes can be modified. Whether labour unrest and problem of electricity and social security of labour are related to volatility of export must be explored for future research. Cointegration between the regional export intensity and agricultural value addition relative to GDP may be analysed in case of tea export.

VII. Policy Recommendations

The following are the general policies which should be enforced to increase tea production as well as tea exports :

[i]The industry also needs complete restructuring and reforming of the roles and regulations of various institutes like Tea Board and Producers' organizations

[ii] Focus on Quality improvements is urgent and the Indian tea industry should give paramount emphasis on producing purely organic tea in order to attract the world tea market

[iii] Ensure transparency and guarantee Exporters' reliability

[iv]Develop effective information system

[v] NeedInfrastructure development for exports

[vi] Training for small tea growers(STGs)

[vii]Reduce cost of production compared to other countries

[viii] Demand for Indian tea is sluggish

[ix]Promotion of green tea will increase domestic and export demand

[x] For wider market quality improvement, cost effective productivity and sprucing market infrastructure

[xi]Diversification of tea leave products can open up new avenues

[xii] Need some transparent price determining mechanism

[xiii]Packaging industry of tea should be upgraded

[xiv]Reforms of bank lending policies on tea industry are necessary

[xv]Maximum residual limits in non-tariff barriers and social clauses in plantation sector problems should be minimized

[xvi]Forward integration and branded formation should be focal point to increase export

[xvii]Greater market integration with blocs and individual nations in new WTO rules are urgent

[xviii]Make tea industries organized

[xix] Improvement of labour intensity and productivity are must

[xx] Reduction of cost of production with respect to Indonesia is needed

[x] Reduce the gap between auction price and retail price of tea export

[xxi] Training of labour in plantation and processing are needed

[xxii] R and D must be improved

VIII. Conclusions

On the one hand, it has been shown thatIndian teaexports have been increasing at the rate of 6.43% per year during 1951-52 to 2013-14 but increased exponentially at the rate 0.1179%

per year whereas it shows three structural breaks also in 1975, 1985 and 1998 respectively and on the other hand it has been proved thatIndian tea export and GDP growth rate are cointegrated in the order of C(1) and they are significantly positively correlated during 1951-52 to 2013-14. However, the export management system, licensing system and international price competitiveness policies are needed to implement soon and the problem of deficiency of tea production need to be addressed efficiently to take the Indian tea industry to the next level.

References

Alkheteab,T. & Zafar, A. S. (2015).Determinants of India's Agricultural Exports, *European Journal of Business Management*, Vol-7, No-1.

Asopa,V.N.(2009).India's Global Tea Trade, Centre for Management in Agriculture, IIM, Ahmedabad, December, *CMA Publication No-235.*

Bhatt,V.(2012).A Global Study Report on Revitalising Indian Tea Export in Russia, Thesis submitted to Gujarat Technological University.

Bhowmik, D. (2016). Nexus Between GDP Growth Rate and Tea Export in India,*Business Sciences International Research Journal*,Volume-4,Issue-1,197-203.

…………(2016).The Nature of Indian GDP growth Rate.Forthcoming Dutta, S., Sarmah, S.P. &Goyal, S.K. (2010). Evolutionary Stability of Auction and Supply Chain Contracting: AnAnalysis Based on Disintermediation in the Indian Tea Supply Chains. *European Journal of Operational Research*,207, 531-538.

Enders,W.(1995).*Applied Econometric Time Series*, John Wiley & Sons, New York.

Ganguly, A., Ghosh, K. & Biswas, S. (2011).Tea Export and its impact at the grassroots, *CUTS Briefing No-1/2011*.

G.O.I.(2005).Tea Distribution and Export Control order, Ministry of Commerce and Industry.

Granger, C.W.J.(1969). Investigating Causal Relations by Econometric Models and Cross-spectral Methods, *Econometrica*, Vol-37,No-3, 424-438.

Griffiths, P. (1967). *The History of the Indian Tea Industry*. London: Weidenfeld and Nicolson.

Hazarika, K. (2011). Changing Market Scenario for Indian Tea, *International Journal of Trade, Economics and Finance, Vol. 2, No. 4..*

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

……….(1991). Estimation of Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models, *Econometrica* 59,1551-80.

………..(1994).The role of the constant and linear terms in cointegration analysis of nonstationary variables. *Econometric Reviews*, 13, 205-229.

Johansen S. (1995). *Likelihood-Based Inference in Cointegrated Vector Autoregressive Models.*Oxford University Press.

……….(1996).*Likelihood-Based Inference in Cointegrated Vector Autoregressive Models,*2nd edition, Oxford University Press.

……….. &Juselius, K. (1990). Maximum likelihood estimation and cointegration with application to the demand of money. *Oxford Bulletin of Economics and Statistics*,Vol-52, No-2,169-210.

Joseph, M. (2002). Problems and Prospects Of Tea Plantation Industry In Kerala,PhD Thesis, Department Of Applied Economics,Cochin University Of Science And Technology.

Juselius, K. (2006). *The Cointegrated VAR Model*, Oxford University Press.

Kiptui, M.(2007). Does the Exchange Rate matter for Kenya's Exports? A Bounds Testing Approach, *African Econometric Society Conference*.

Kumar, P., Badal, P.S., Singh, N.P.&Singh, R.P.(2008). Tea Industry in India: Problems and Prospects, *Indian Journal of Agricultural Economics,*Vol. 63, No. 1

Liu,H. & Shao, S.(2016). India's Tea Price Analysis Based on ARMA Model, *Modern Economy*, 7, 118-123.

Maity, S &Ghosh, M (2015).India's Tea Exports in the scenario of trade openness: An Analysis of trend and structural shift, *American-Eurasian Journal of Scientific Research,*Vol-10,No-1,01-11.

Mithamia, Ages Kinya & Muturi,Willey. (2015). Determinants of earnings from tea export in Kenya :1980-2011, *Journal of World Economic Research*,Vol-4,No-1,15-22.

Nathan,V. & Sreenivas, S. (2014). Dynamics Of India's Tea Production: An Econometric Analysis,*International Journal of Scientific and Research Publications,* Volume 4, Issue 12.

Veeramani, C. (2012). Competitive Structure Of Plantation Commodity Exports: India's Tea And Coffee Exports In A Comparative Perspective,*NRPPD Discussion Paper*,12

Samantaray, M. N. & Kumar A. (2012). An analysis of trends of tea industry in India, *The International Journal of Management* ,Vol- 1,Issue -4.

Saravanakumar, M., &, Chinnasamy, A.V. (2013). An Empirical Analysis of the Domestic Trends in Tea Imports of India, *IOSR Journal Of Humanities And Social Science (IOSR-JHSS)* Volume 8, Issue 5 , 56-60

Sarkar, G. (1972). *The World Tea Economy*. Delhi: Oxford University Press.

Sarkar, K.(2014).Changing Institutional Architecture and India's Export Competitivenessin

Tea, *NRPPDD,DP NO-35*,GOI,Centre for Indian Development Studies, Thiruvanthapuram.

Shil, P., & Das, S. (2012). Indian Tea Industry In The Context Of Intellectual Property Right (IPR) And Geographical Indication (GI), *Asia Pacific Journal of Marketing & Management Review*, Vol.1 No. 2.

Shombe, N. H. (2008). Causality Relationships between Total Exports with Agricultural and Manufacturing GDP in Tanzania, *IDE Discussion Paper No. 136.*

Sivanesan, R.(2013). Tea Industry in India—Analysis of import and export of Tea-International *Journal of Business and Management Invention*.Vol-2, Isuue-8, 9-15.