European Journal of Business and Management
ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online)
Vol.10, No.36, 2018

Marketing Opportunities and Export Competitiveness of Indian Spices: An Econometric Analysis

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Abstract
The study intends to analyze the export competitiveness of Indian pepper. The variables that have been analyzed are Export, Real GDP, REER, Inflation, FDI, and Production. The results have been used to forecast the future of pepper by using advanced time series econometrics Vector Auto Regression Method.
Keywords: Vector Auto Regression, Export, Real GDP, REER, Inflation, FDI, and Production

1. Introduction

The attempt is to analyze the performance and to forecast the contribution of Indian Pepper in the total export and also to see whether there is any scope for Indian Spices in the world market by 2020. One of the most important factors, which could stimulate the development of the national economy, is export. Higher export competitiveness could help the country to overcome after-effects of economic recession and stimulate the development of the total national economy. Competitiveness is a central preoccupation of all countries in an increasingly open and integrated world economy, characterized by the tendency of freer trade, less regulation, and even more challenging trade.

Export is often associated with the competitiveness of the country at the international level. While the academic understanding of international competitiveness of the country is still forming, the factors of international competitiveness are still being identified in scientific literature. Export competitiveness can be measured in different ways: by analyzing one or more factors of the country's export, creating composite indices, and conditions which stimulate international trade, etc. As every method has its advantages and disadvantages. The scientists seek to find the most reliable, methodologically justified, understandable, convenient to practical use and objective method, which could be accepted generally and widely used in strategic planning on improving the competitiveness of the national export and total national economy.

As far as the agriculture products are concerned the future of export can be looked from two aspects viz, production productivity and the area under cultivation on the domestic or internal side and the other external macroeconomic factors like Real GDP, Foreign Direct Investment, Real Effective Exchange Rate and Inflation. This study analyses the export of Indian spices viz., Pepper in relation to both these internal as well as external factors.

2. Export Competitiveness

In an open and integrated world economy, competitiveness has become an inevitable one. However, the freer trade is becoming more challenging nowadays. Hence, it is essential to look into the definitions of export competitiveness.

According to Michael E. Porter, Christian Ketels and Mercedes Delgado's definition "makes competitiveness a zero-sum game, because one country's gain comes at the expense of others". This view of competitiveness is used to justify interventions to skew market outcomes in a so-called strategic industrial policy, including subsidies, artificial restraints on local wages, and intervention to devalue the nation's currency. In fact, the authors agree that "lower wages or devaluation make a nation more competitive." Although widely used in economics and business management, the usefulness of the concept, particularly in the context of national competitiveness, is vigorously disputed by economists, like Paul Krugman, who argues that "As a practical matter, however, the doctrine of 'competitiveness' is flatly wrong. The world's leading nations are not, to any important degree, in economic competition with each other." Eurostat's Concepts and Definitions Database (CODED) defines competitiveness as "The ability of companies, industries, regions or supranational regions to generate while being and remaining exposed to international competition, relatively high factor income, and factor employment levels on a sustainable basis." The European Central Bank analyses developments according to a whole host of such indicators. This concept of competitiveness is linked to the "external performance" of a country, typically measured in terms of export growth, shares of export markets or current account balances. Developments in price competitiveness have always been important drivers of an economy's ability to compete in international markets. But in recent years, other factors have become increasingly important in the face of the

structural changes engendered by globalization. These relate to export specialization, which includes the range and the quality of the products a country exports, and the particular markets it exports to. In this regard, it is important that a country takes advantage of its high technological advancement and well-educated labor forces, to produce higher quality and more sophisticated goods and to redirect its exports towards strongly growing markets.

True competitiveness, then, is measured by productivity. Productivity supports high wages, a strong currency, and attractive returns to capital—and with them a high standard of living. Many nations can improve their prosperity if they can improve productivity. Recent advances in trade theory have stressed the connections between the external and internal dimensions of competitiveness, which have become increasingly relevant in a globalizing economy. According to this body of economic knowledge, continuing efforts to promote stronger competition and further market integration appear to be important tools for supporting and enhancing the global competitiveness of one's economy.

Globalization has given a boost to world trade over the past two decades, world trade has grown 1.5 times faster than world output, and the difference has even considerably higher in recent years as world trade growth accelerated very strongly. Transport costs have dropped dramatically, as have tariffs, and the surge in information and communication technology has facilitated a global exchange of goods and services as well as globalized supply chains. More and more goods and services have become tradable, and domestic companies have increasingly engaged in international trade.

Analytical Framework

There are numerous factors which affect the export performance of Indian Spices. It is useful to analyze the performance of Indian spices during the pre-liberalization and post-liberalization period so as to understand the influence of liberalization on exports. The time series data for a period of 41 years has been taken for analysis. The pre-liberalization period has been defined from 1970-71 to 1990-91 and post-liberalization is from 1991-92 to 2011-12. The analysis has been done in the following manner.

A detailed econometric analysis has been done to examine the future of Indian spices but before going into the econometric analysis a simple statistical growth analysis is done to know the trend and growth of exports, production, productivity and area under cultivation of Spices. After this, a detailed and meticulous econometric modeling and analysis has been done.

3.1 The Econometric model:

The appropriate econometric model which can be used is

$Y_{Exp} = \beta_0 x_1^{\beta 1} x_2^{\beta 2} x_3^{\beta 3} e^u$

$\text{Log } Y_{Exp} = \log \beta_0 + \beta_1 \log x_1 + \beta_2 \log x_2 + \beta_3 \log x_3 + \ldots\ldots\ldots\ldots + u$

The model can be rewritten with the variables that have taken for analysis as the following:

$Y_{Exp} = \beta_0 (RealGDP)^{\beta 1} (REER)^{\beta 2} (Inflation)^{\beta 3} (FDI)^{\beta 4} (Production)^{\beta 5} + u$

$\text{Log } Y_{Exp} = \log \beta_0 + \beta_1 \text{lnRealGDP} + \beta_2 \text{lnREER} + \beta_3 \text{lnInflation} + \beta_4 \text{lnFDI} + \beta_5 \text{lnProduction} + u$

Or

$Y_{Exp} = \alpha + \beta_1 \upsilon_1 + \beta_2 \upsilon_2 + \beta_3 \upsilon_3 + \beta_4 \upsilon_4 + \beta_5 \upsilon_5 + u$

Where,

$\alpha = \log \beta_0$, $\upsilon_1 = \text{lnRealGDP}$, $\upsilon_2 = \text{lnREER}$, $\upsilon_3 = \text{lnInflation}$, $\upsilon_4 = \text{lnFDI}$, $\upsilon_5 = \text{lnProduction}$

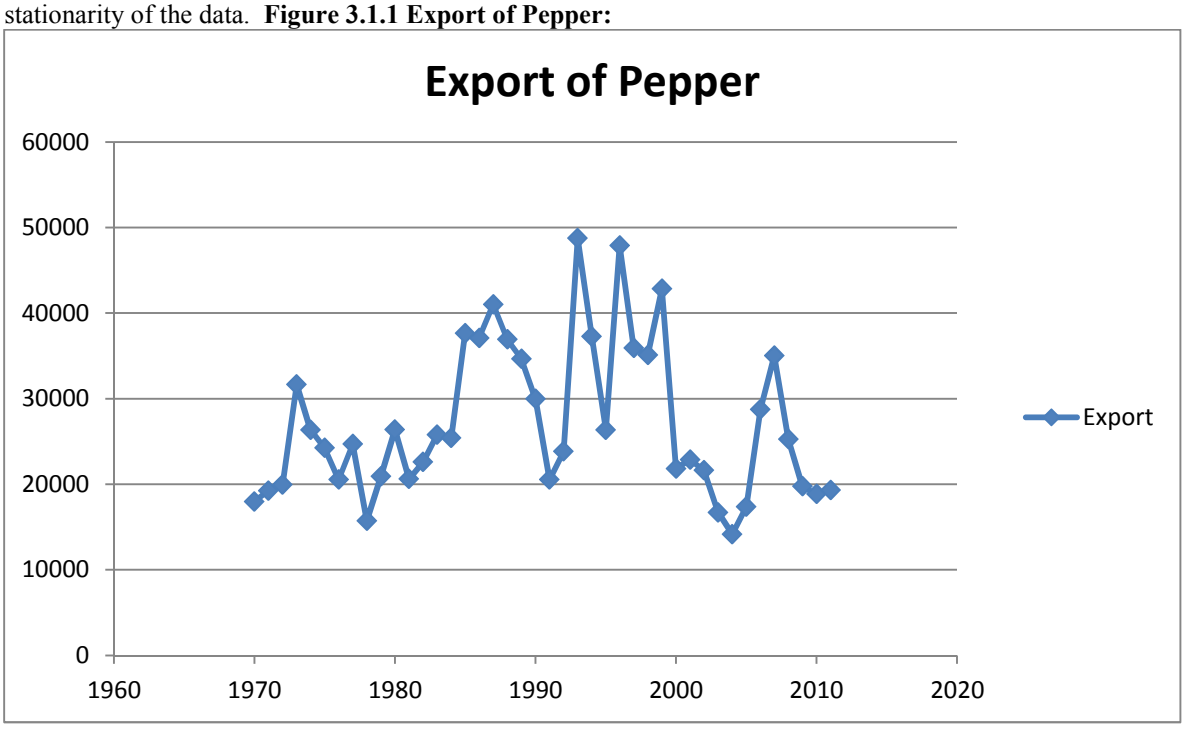
3.1.1 The Problem of Spurious Regression:

It is very common to see reported in applied econometric literature time series regression equations with an apparently high degree of fit, as measured by the coefficient of multiple-correlation R2 or the corrected coefficient R2, but with an extremely low value for the Durbin-Watson statistic. We find it very curious that whereas virtually every textbook on econometric methodology contains explicit warnings of the dangers of autocorrelated errors, this phenomenon crops up so frequently in well-respected applied work. Numerous examples could be cited, but doubtless, the reader has met sufficient cases to accept our point. It would, for example, be easy to quote published equations for which R2=0.997 and the Durbin-Watson statistic (d) is 0.53. The most extreme example we have met is an equation for which R2 = 0.99 and d = 0.093. However, we shall suggest that cases with much less extreme values may well be entirely spurious. The recent experience of one of us [see Box and Newbold (1971)] has indicated just how easily one can be led to produce a spurious model if sufficient care is not taken over an appropriate formulation for the autocorrelation structure of the errors from the regression equation. We felt, then, that we should undertake a more detailed inquiry seeking to determine what, if anything, could be inferred from those regression equations having the properties just described.

Stationarity Test:

The export data of Pepper for a period of 42 years has been taken. To have an idea of the time series nature of the data, the export data has been plotted as follows. By plotting the data we will have an idea about the

stationarity of the data. **Figure 3.1.1 Export of Pepper:**

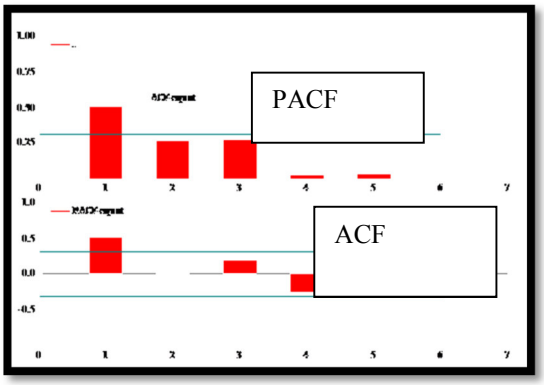


The above figures show the total export of Pepper from 1970-71 to 2011-12. The data seems to be stationary but to examine the stationarity the following methods have been used.

Plotting Correlogram

Augmented Dicky Fuller Test

Figure3.1.3 Correlogram



The above Correlogram shows both Partial Autocorrelation and Autocorrelation Function. The correlogram shows that the data is not stationary. It is defined that if Auto Correlation coefficient is lying between the 95 % confidence interval then we cannot reject the null hypothesis. Here the null is that there is unit root. We are not in a position to reject the null because there is no fast decaying and the values are in between the confidence interval. Hence, the data is non-stationary.

In the literature Said and Dickey (1984) augment the basic autoregressive unit root test to accommodate general ARMA (p, q) models with unknown orders and their test is referred to as the augmented Dickey- Fuller (ADF) test. The ADF test tests the null hypothesis that a time series yt is I(1) against the alternative that it is I(0), assuming that the dynamics in the data have an ARMA structure.

3.1.4 Unit Root test Augmented Dickey-Fuller test statistic

Variables	t-Statistic	Prob.*
Export	-3.293687	0.0217
Ist Difference	-6.284067	0.0000
Production	-1.553925	0.4966
I St Difference	-7.832671	0.0000
Realgdp	-1.463666	0.5412
I St Difference	-7.462537	0.0000
Fdi	-0.452098	0.8902
I St Difference	-6.629165	0.0000
Reer	-2.150837	0.2268
I St Difference	-5.212305	0.0001
Inflation	-4.255994	0.0017
*MacKinnon (1996) one-sided p-values.		

3.1.2 Ordinary Least Squares (OLS)

The Ordinary Least Squares (OLS) approach to multiple linear regression was introduced by Gauss in 1794. The OLS procedure is the simplest type of estimation procedure used in statistical analyses.

$$\mathbf{Y_{Exp} = \beta_0 x_1^{\beta 1} x_2^{\beta 2} x_3^{\beta 3} e^u}$$

$$\mathbf{Log\ Y_{Exp} = \log \beta_0 + \beta_1 \log x_1 + \beta_2 \log x_2 + \beta_3 \log x_3 + \ldots\ldots\ldots\ldots + u}$$

The model can be rewritten with the variables that have taken for analysis as the following:

$$\mathbf{Y_{Exp} = \beta_0 (RealGDP)^{\beta 1} (REER)^{\beta 2} (Inflation)^{\beta 3} (FDI)^{\beta 4} (Production)^{\beta 5} + u}$$

$$\mathbf{Log\ Y_{Exp} = \log \beta_0 + \beta_1 lnRealGDP + \beta_2 lnREER + \beta_3 lnInflation + \beta_4 lnFDI + \beta_5 lnProduction + u}$$

Or

$$\mathbf{Y_{Exp} = \alpha + \beta_1 \upsilon_1 + \beta_2 \upsilon_2 + \beta_3 \upsilon_3 + \beta_4 \upsilon_4 + \beta_5 \upsilon_5 + u}$$

Where,

$\alpha = \log \beta_0$, υ_1= lnRealGDP, υ_2= lnREER, υ_3= lnInflation, υ_4= lnFDI, υ_5= lnProduction

Results and Interpretation:

OLS Results for Pepper:

Dependent Variable: LNEXPORT				
Method: Least Squares				
Sample: 1970 2011				
Included observations: 42				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.10275	8.273385	1.221115	0.2300
REALGDP	0.076600	0.322146	0.237780	0.0134
FDI	-0.059109	0.033753	-1.751211	0.0284
INFLATION	0.303105	0.220909	1.372085	0.0485
PRODUCTION	0.189342	0.297919	0.635550	0.0291
REER	-0.590041	0.419823	-1.405455	0.0185
R-squared	0.703167	Mean dependent var		10.15888
Adjusted R-squared	0.892496	S.D. dependent var		0.314320
S.E. of regression	0.299430	Akaike info criterion		0.557694
Sum squared resid	3.227709	Schwarz criterion		0.805933
Log likelihood	-5.711579	Hannan-Quinn criter.		0.648683
F-statistic	1.835773	Durbin-Watson stat		1.166794
Prob(F-statistic)	0.130518			

The model can be written as follows:

$Y_{Exp} = \alpha + \beta_1 \upsilon_1 + \beta_2 \upsilon_2 + \beta_3 \upsilon_3 + \beta_4 \upsilon_4 + \beta_5 \upsilon_5 + u$

$Y_{Exp} = \beta_0 (RealGDP)^{\beta 1} (REER)^{\beta 2} (Inflation)^{\beta 3} (FDI)^{\beta 4} (Production)^{\beta 5} + u$

$Y_{Exp} = 10.10275 + 0.076600\ \upsilon_1 + -0.059109\ \upsilon_2 + 0.303105\ \upsilon_3 + 0.189342\ \upsilon_4 + -0.590041\ \upsilon_5 + \varepsilon$

The OLS estimation shows that there is a positive relationship between the Export of pepper real GDP, Production, and FDI. There exists a negative relationship between the exports and Inflation and Real Effective Exchange Rate.

Increasing GDP is the major target of any economy. There are many different approaches to achieve this goal; one possibility is to promote export. But this, however, raises questions, should a country promote export to

speed up economic growth or should it primarily focus on economic growth to generate international trade? It goes side by side. Here in this analysis the analysis shows there is a direct relationship between the real GDP and Pepper Exports. Production is another factor which has been analyzed. There is a positive relationship between the export and the production Another Macroeconomic variable which we have taken here is FDI. The most important factors explaining the gush of FDI inflows into developing countries in recent years have been the foreign acquisition of domestic firms in the process of privatization, the globalization of production, and increased economic and financial integration. The profit motive of MNCs attracts them to developing countries. The development of industries obviously affects the agriculture sector. The analysis shows a positive relationship between FDI and Export of Pepper. There has been an increasing role of macroeconomic policies, especially the exchange rate policy, to enhance the exports and provide neutral incentives to import-competing and export-oriented sectors. However, these policies have undergone significant changes over time. Countries across the globe, regardless of their level of development, are now pursuing policies that will allow them to enter the new era of globalization and reap the benefits from such an unprecedented development in the international economic order. The exchange rate exerts a strong influence on a country's trade as shown by a high correlation between the real exchange rate and exports. It is a major factor in determining the international competitiveness of a country. An overvaluation of the exchange rate leads to a rising trade deficit and falling reserves, which often prompt the increased use of exchange control and trade barriers and vice versa. In the present day scenario of falling levels of tariff and a reduced number of non-tariff barriers, the exchange rate has assumed a crucial role in influencing the trade deficit. Here in this study, we could see that there is a negative impact on the export as the real effective exchange rate changes. There has been an indirect relationship between the two.
A clear picture has to be derived for using these variables to forecast the exports for twenty years ahead.

3.1.3 Cointegration:

The superior test for cointegration is Johansen's test. This is a test, which has all desirable statistical properties. The weakness of the test is that it relies on asymptotic properties, and is therefore sensitive to specification errors in limited samples.

Table 3.1.3.1 Cointegration Results for Pepper

VAR Lag Order Selection Criteria						
Endogenous variables: REER REALGDP PRODUCTION LNEXPORT INFLATION FDI EXPORT						
Exogenous variables: C						
Sample: 1970 2011						
Included observations: 40						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-381.2565	NA	0.636200	19.41282	19.70838	19.51969
1	-224.3993	250.9715*	0.003007*	14.01997	16.38440*	14.87487*
2	-172.4318	64.95943	0.003265	13.87159*	18.30490	15.47453
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

'r' denotes the number of cointegrating vectors. By applying the test, the test statistic is found to be greater than the critical value. So the null hypothesis is rejected and there are no cointegrating vectors. The null hypothesis is rejected when $r = 0$ against the alternative hypothesis of $r \geq 1$. The same is true of the second row. The null hypothesis is rejected when $r = 1$ against the alternative hypothesis of $r \geq 2$. The null hypothesis of $r \leq 2$ and $r \leq 3$ can also be rejected. From the results, the researcher concluded the presence of two cointegrating vectors in the sample. This finding suggests that there is a long-run equilibrium relationship between Exports, FDI, Inflation, Production, and exchange-rate volatility. There are two independent linear combinations of the variables that are stationary. The critical values allow for a linear deterministic trend in the cointegrating vector

unrestrictedly. The lag lengths used are nine.

Table 3.1.3.3 VAR Lag Exclusion Wald Test Results

VAR Lag Exclusion Wald Tests
Sample: 1970 2011
Included observations: 38
Chi-squared test statistics for lag exclusion:
Numbers in [ ] are p-values

	LNEXPORTCARD	LNPDN	LNINFLATION	LNFDI	LNGDP
Lag 1	9.402212	5.430457	11.05045	7.506228	8.391529
	[0.152189]	[0.489901]	[0.086830]	[0.276554]	[0.210799]
Lag 2	7.661728	5.797890	8.563447	2.171456	5.856984
	[0.263948]	[0.446207]	[0.199659]	[0.903274]	[0.439400]
Lag 3	13.62712	6.216093	7.342216	1.909238	2.478194
	[0.034090]	[0.399424]	[0.290355]	[0.927854]	[0.870900]
Lag 4	6.055400	2.752686	8.610166	1.204528	6.297593
	[0.417013]	[0.839185]	[0.196718]	[0.976660]	[0.390692]
df	6	6	6	6	6

Table 3.1.3.5 Co integration results of Pepper with Liberalization as an Exogenous variable:

Sample (adjusted): 1972 2011
Included observations: 40 after adjustments
Trend assumption: Linear deterministic trend
Series: REER REALGDP PRODUCTION LNEXPORT INFLATION FDI EXPORT
Exogenous series: LIB
Warning: Critical values assume no exogenous series
Lags interval (in first differences): 1 to 1
Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.798428	174.7273	125.6154	0.0000
At most 1 *	0.614785	110.6630	95.75366	0.0032
At most 2 *	0.526753	72.50484	69.81889	0.0300
At most 3	0.333157	42.57937	47.85613	0.1431
At most 4	0.324090	26.37136	29.79707	0.1180
At most 5	0.216131	10.70355	15.49471	0.2304
At most 6	0.023788	0.963037	3.841466	0.3264

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.798428	64.06431	46.23142	0.0003
At most 1	0.614785	38.15811	40.07757	0.0810
At most 2	0.526753	29.92548	33.87687	0.1379
At most 3	0.333157	16.20801	27.58434	0.6481
At most 4	0.324090	15.66780	21.13162	0.2449
At most 5	0.216131	9.740515	14.26460	0.2295
At most 6	0.023788	0.963037	3.841466	0.3264

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):				
REER	REALGDP	PRODUCTION	LNEXPORT	INFLATION
2.041669	0.674234	-2.388150	-27.01159	-1.300878
0.631034	3.067446	1.159392	4.558418	-3.341008
-0.818112	2.528341	1.001111	-17.01898	5.605710
5.831481	2.237383	4.614310	4.295817	-0.782618
-7.507283	3.137851	-1.732394	-0.475530	-1.232775
0.421588	-1.850216	-5.387371	6.430360	1.675797
3.989717	-6.098619	-0.492351	-3.007836	-0.095503
Unrestricted Adjustment Coefficients (alpha):				
D(REER)	-0.004503	-0.007177	0.001435	-0.016728
D(REALGDP)	0.033949	-0.036057	-0.022421	-0.009156
D(PRODUCTION)	0.019603	0.062536	-0.023859	-0.016580
D(LNEXPORT)	0.031114	-0.121247	0.043899	0.062831
D(INFLATION)	0.072056	0.016075	-0.091572	0.034882
D(FDI)	0.005437	-0.050066	0.032332	-0.273267
D(EXPORT)	-397.4352	-3594.674	943.3381	2014.146
1 Cointegrating Equation(s):		Log likelihood	-218.4047	
Normalized cointegrating coefficients (standard error in parentheses)				
REER	REALGDP	PRODUCTION	LNEXPORT	INFLATION
1.000000	0.330237	-1.169705	-13.23015	-0.637164
	(0.35134)	(0.32761)	(1.49420)	(0.31471)
Adjustment coefficients (standard error in parentheses)				
D(REER)	-0.009195			
	(0.01568)			
D(REALGDP)	0.069312			
	(0.02884)			
D(PRODUCTION)	0.040023			
	(0.05292)			
D(LNEXPORT)	0.063524			
	(0.10129)			
D(INFLATION)	0.147115			
	(0.07673)			
D(FDI)	0.011101			
	(0.27405)			
D(EXPORT)	-811.4312			
	(2986.13)			
2 Cointegrating Equation(s):		Log likelihood	-199.3256	

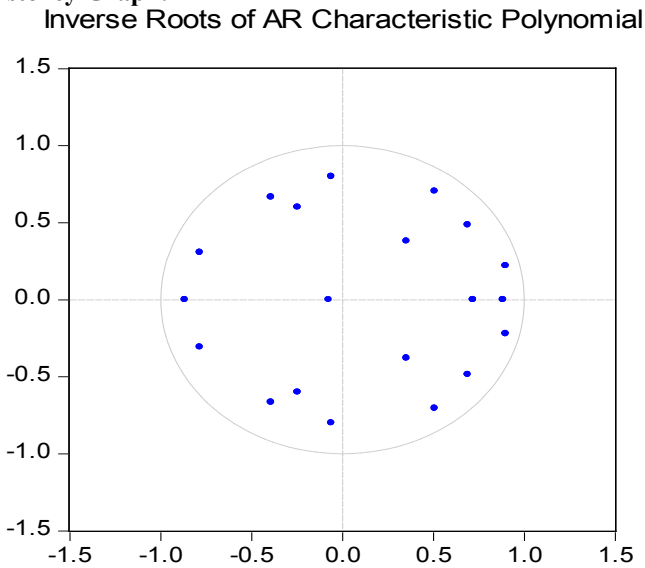
Normalized cointegrating coefficients (standard error in parentheses)				
REER	REALGDP	PRODUCTION	LNEXPORT	INFLATION
1.000000	0.000000	-1.388878	-14.72099	-0.297701
		(0.30878)	(1.67775)	(0.35486)
0.000000	1.000000	0.663686	4.514459	-1.027940
		(0.31179)	(1.69410)	(0.35831)
Adjustment coefficients (standard error in parentheses)				
D(REER)	-0.013723	-0.025050		
	(0.01617)	(0.02376)		
D(REALGDP)	0.046559	-0.087713		
	(0.02671)	(0.03925)		
D(PRODUCTION)	0.079485	0.205042		
	(0.04973)	(0.07308)		
D(LNEXPORT)	-0.012987	-0.350940		
	(0.09488)	(0.13945)		
D(INFLATION)	0.157259	0.097892		
	(0.08007)	(0.11767)		
D(FDI)	-0.020492	-0.149910		
	(0.28618)	(0.42059)		
D(EXPORT)	-3079.792	-11294.43		
	(2793.19)	(4105.11)		
3 Cointegrating Equation(s):		Log likelihood	-184.3629	
Normalized cointegrating coefficients (standard error in parentheses)				
REER	REALGDP	PRODUCTION	LNEXPORT	INFLATION
1.000000	0.000000	0.000000	16.28375	-6.395884
			(5.00520)	(1.12071)
0.000000	1.000000	0.000000	-10.30139	1.886124
			(2.01300)	(0.45073)
0.000000	0.000000	1.000000	22.32358	-4.390726
			(3.98456)	(0.89218)
Adjustment coefficients (standard error in parentheses)				
D(REER)	-0.014898	-0.021421	0.003871	
	(0.01730)	(0.03049)	(0.02145)	
D(REALGDP)	0.064902	-0.144400	-0.145324	
	(0.02702)	(0.04761)	(0.03350)	
D(PRODUCTION)	0.099005	0.144717	0.001803	
	(0.05231)	(0.09217)	(0.06486)	
D(LNEXPORT)	-0.048901	-0.239949	-0.170929	
	(0.09993)	(0.17608)	(0.12390)	
D(INFLATION)	0.232175	-0.133633	-0.245117	
	(0.07672)	(0.13519)	(0.09513)	
D(FDI)	-0.046943	-0.068164	-0.038664	
	(0.30613)	(0.53942)	(0.37958)	
D(EXPORT)	-3851.548	-8909.352	-2274.116	
	(2964.80)	(5224.09)	(3676.11)	
Adjustment coefficients (standard error in parentheses)				
D(REER)	-0.112449	-0.058849	-0.073318	-0.007360
	(0.04333)	(0.03190)	(0.03747)	(0.22506)
D(REALGDP)	0.011509	-0.164886	-0.187573	-0.739125

	(0.07322)	(0.05390)	(0.06332)	(0.38029)
D(PRODUCTION)	0.002321	0.107622	-0.074701	0.090398
	(0.14194)	(0.10448)	(0.12273)	(0.73716)
D(LNEXPORT)	0.317498	-0.099372	0.118993	-1.870327
	(0.26397)	(0.19430)	(0.22825)	(1.37094)
D(INFLATION)	0.435587	-0.055590	-0.084162	-0.164761
	(0.20622)	(0.15180)	(0.17832)	(1.07104)
D(FDI)	-1.640493	-0.679566	-1.299602	-2.099259
	(0.77764)	(0.57241)	(0.67242)	(4.03875)
D(EXPORT)	7893.907	-4402.935	7019.779	-13052.92
	(7782.86)	(5728.85)	(6729.84)	(40421.3)
Adjustment coefficients (standard error in parentheses)				
D(REER)	-0.151256	-0.042628	-0.082274	-0.009818
	(0.06700)	(0.03822)	(0.03897)	(0.22298)
D(REALGDP)	0.071223	-0.189844	-0.173793	-0.735343
	(0.11340)	(0.06469)	(0.06596)	(0.37738)
D(PRODUCTION)	-0.399365	0.275516	-0.167395	0.064954
	(0.19989)	(0.11402)	(0.11626)	(0.66520)
D(LNEXPORT)	-0.362617	0.184899	-0.037951	-1.913407
	(0.37894)	(0.21616)	(0.22041)	(1.26105)
D(INFLATION)	0.206334	0.040232	-0.137065	-0.179282
	(0.31723)	(0.18096)	(0.18451)	(1.05569)
D(FDI)	-2.976598	-0.121109	-1.607924	-2.183892
	(1.17144)	(0.66823)	(0.68136)	(3.89835)
D(EXPORT)	-11580.36	3736.808	2525.862	-14286.47
	(11230.5)	(6406.26)	(6532.13)	(37373.1)
Adjustment coefficients (standard error in parentheses)				
D(REER)	-0.151550	-0.041337	-0.078512	-0.014307
	(0.06705)	(0.04026)	(0.05367)	(0.22725)
D(REALGDP)	0.079962	-0.228197	-0.285468	-0.602048
	(0.10729)	(0.06442)	(0.08588)	(0.36362)
D(PRODUCTION)	-0.392134	0.243781	-0.259798	0.175247
	(0.19771)	(0.11872)	(0.15826)	(0.67006)
D(LNEXPORT)	-0.364381	0.192640	-0.015410	-1.940312
	(0.37922)	(0.22770)	(0.30354)	(1.28519)
D(INFLATION)	0.181279	0.150192	0.183111	-0.561443
	(0.29924)	(0.17968)	(0.23953)	(1.01414)
D(FDI)	-3.015147	0.048067	-1.115325	-2.771857
	(1.16109)	(0.69717)	(0.92939)	(3.93498)
D(EXPORT)	-11496.12	3367.105	1449.379	-13001.58
	(11235.3)	(6746.15)	(8993.18)	(38076.7)

There is cointegration as the trace values at one shows higher value than the table value and also the probability values are also significant. This reveals that the variables are not integrated. Now we have to see the stability of the model.

3.1.4 Model Consistency Test:

Figure 3.1.4 Model Consistency Graph:



The values are inside the circle that means the value is less than one. We can conclude that there are no shocks in the model and the model is consistent.

3.1.5 Vector Autoregression:

A VAR model describes the evolution of a set of *k* variables (called *endogenous variables*) over the same sample period ($t = 1, ..., T$) as a linear function of only their past values.

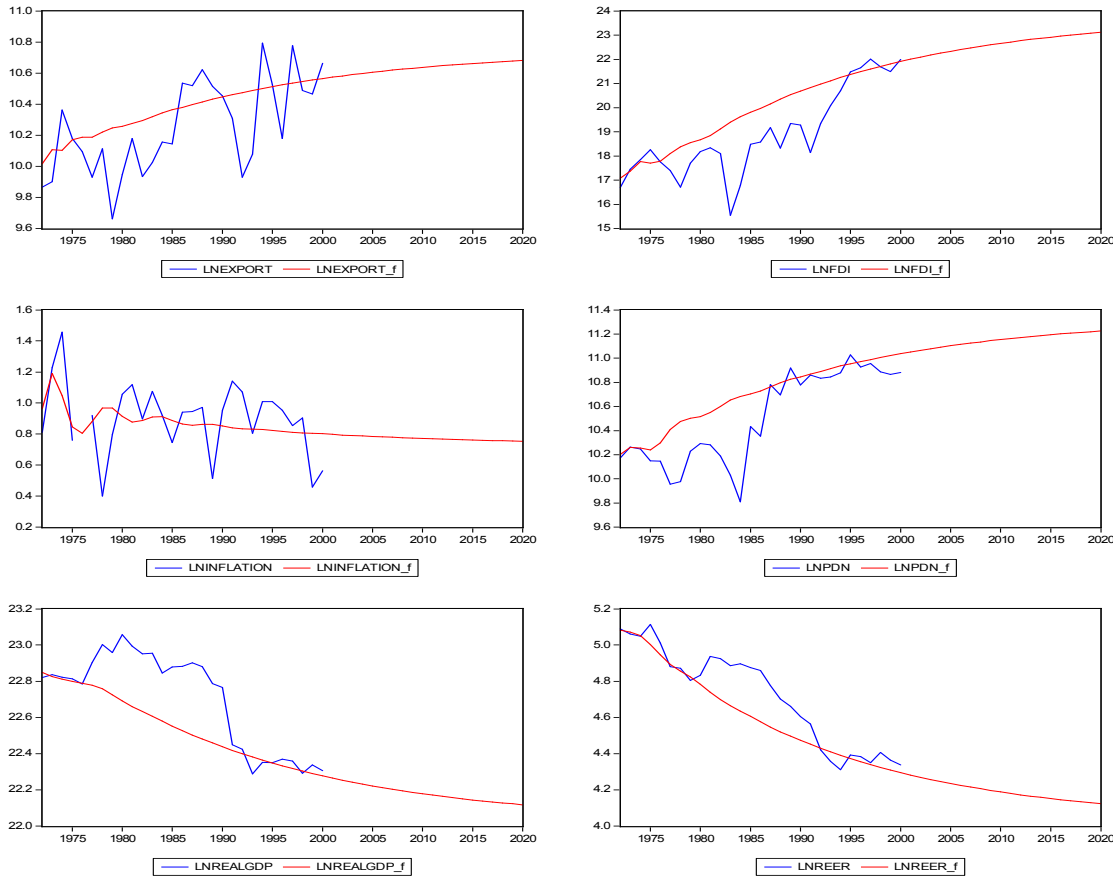
The vector autoregression (VAR) model is one of the most successful, flexible, and easy to use models for the analysis of multivariate time series. It is a natural extension of the univariate autoregressive model to dynamic multivariate time series. The VAR model has proven to be especially useful for describing the dynamic behavior of economic and financial time series and for forecasting. It often provides superior forecasts to those from univariate time series models and elaborate theory-based simultaneous equations models. Forecasts from VAR models are quite flexible because they can be made conditional on the potential future paths of specified variables in the model. In addition to data description and forecasting, the VAR model is also used for structural inference and policy analysis. In structural analysis, certain assumptions about the causal structure of the data under investigation are imposed, and the resulting causal impacts of unexpected shocks or innovations to specified variables on the variables in the model are summarized. These causal impacts are usually summarized with impulse response functions and forecast error variance decompositions.

Table 3.1.5 VAR Estimate for Pepper:

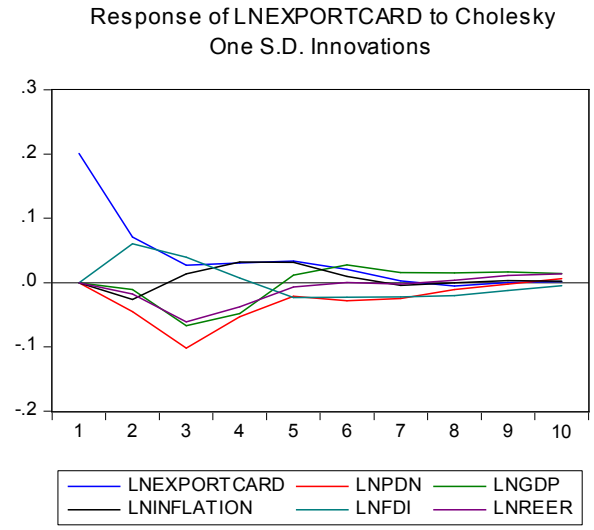
Sample (adjusted): 1972 2011							
Included observations: 40 after adjustments							
Standard errors in ( ) & t-statistics in [ ]							
	REER	REALGDP	PRODUCTION	LNEXPORT	INFLATION	FDI	EXPORT
REER(-1)	1.023135	0.047568	-0.130664	-0.597363	0.529226	-0.542066	-15625.85
	(0.16930)	(0.31313)	(0.49676)	(0.97851)	(0.75226)	(3.00776)	(28281.1)
	[6.04323]	[0.15191]	[-0.26303]	[-0.61048]	[0.70352]	[-0.18022]	[-0.55252]
REER(-2)	-0.192012	0.037837	-0.236617	0.286265	-0.374180	-2.231311	5859.849
	(0.16677)	(0.30845)	(0.48934)	(0.96389)	(0.74101)	(2.96280)	(27858.4)
	[-1.15135]	[0.12267]	[-0.48355]	[0.29699]	[-0.50496]	[-0.75311]	[0.21034]
REALGDP(-1)	0.368362	0.624785	-0.085111	-0.379040	-0.127373	0.220802	-9331.233
	(0.10435)	(0.19300)	(0.30619)	(0.60313)	(0.46367)	(1.85389)	(17431.6)
	[3.52997]	[3.23717]	[-0.27797]	[-0.62846]	[-0.27471]	[0.11910]	[-0.53531]
REALGDP(-2)	-0.364173	0.265155	0.280114	0.671066	0.307697	0.073344	11840.56

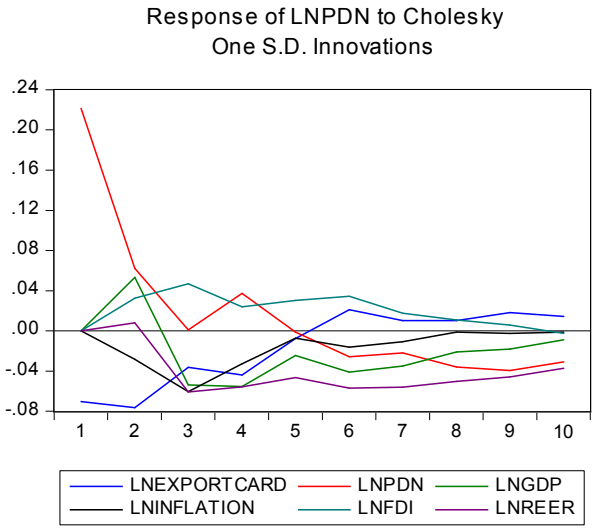
	(0.10768)	(0.19916)	(0.31596)	(0.62237)	(0.47846)	(1.91306)	(17987.9)
	[-3.38190]	[1.33135]	[0.88655]	[1.07824]	[0.64309]	[0.03834]	[0.65825]
PRODUCTION(-1)	0.011159	-0.014809	0.254329	0.219487	0.374958	-1.000831	5643.529
	(0.06279)	(0.11614)	(0.18425)	(0.36293)	(0.27901)	(1.11556)	(10489.3)
	[0.17770]	[-0.12751]	[1.38037]	[0.60477]	[1.34390]	[-0.89715]	[0.53803]
PRODUCTION(-2)	-0.064502	-0.118364	0.469756	-0.022733	-0.200666	0.600367	-2246.234
	(0.06101)	(0.11284)	(0.17902)	(0.35263)	(0.27109)	(1.08391)	(10191.7)
	[-1.05721]	[-1.04893]	[2.62405]	[-0.06447]	[-0.74021]	[0.55389]	[-0.22040]
LNEXPORT(-1)	0.254750	0.201471	-0.360752	1.453912	-0.194041	-0.480038	28523.10
	(0.15972)	(0.29541)	(0.46866)	(0.92315)	(0.70969)	(2.83759)	(26681.0)
	[1.59494]	[0.68200]	[-0.76976]	[1.57494]	[-0.27342]	[-0.16917]	[1.06904]
LNEXPORT(-2)	-0.115663	0.124445	0.437743	-1.101551	-0.421084	2.063558	-29658.86
	(0.16415)	(0.30360)	(0.48164)	(0.94873)	(0.72936)	(2.91621)	(27420.2)
	[-0.70462]	[0.40990]	[0.90886]	[-1.16108]	[-0.57733]	[0.70762]	[-1.08164]
INFLATION(-1)	0.067564	-0.028824	-0.133669	0.038407	0.309290	0.402220	3473.844
	(0.04081)	(0.07548)	(0.11974)	(0.23586)	(0.18132)	(0.72498)	(6816.75)
	[1.65566]	[-0.38190]	[-1.11635]	[0.16284]	[1.70577]	[0.55480]	[0.50960]
INFLATION(-2)	-0.034828	-0.042775	-0.253055	0.297620	-0.128156	-0.584596	8817.599
	(0.04444)	(0.08220)	(0.13040)	(0.25686)	(0.19747)	(0.78953)	(7423.75)
	[-0.78369]	[-0.52041]	[-1.94061]	[1.15869]	[-0.64900]	[-0.74043]	[1.18776]
FDI(-1)	-0.000889	0.031607	0.089130	0.039756	-0.013703	0.855694	1302.010
	(0.01341)	(0.02481)	(0.03935)	(0.07752)	(0.05959)	(0.23827)	(2240.43)
	[-0.06630]	[1.27416]	[2.26487]	[0.51286]	[-0.22993]	[3.59121]	[0.58114]
FDI(-2)	-0.001293	0.000809	-0.107688	-0.085869	-0.000608	-0.032735	-2641.470
	(0.01323)	(0.02447)	(0.03883)	(0.07648)	(0.05879)	(0.23508)	(2210.35)
	[-0.09775]	[0.03307]	[-2.77365]	[-1.12281]	[-0.01034]	[-0.13925]	[-1.19504]
EXPORT(-1)	-9.49E-06	-6.50E-06	1.37E-05	-3.74E-05	1.36E-05	2.31E-05	-0.689531
	(5.4E-06)	(9.9E-06)	(1.6E-05)	(3.1E-05)	(2.4E-05)	(9.5E-05)	(0.89742)
	[-1.76712]	[-0.65433]	[0.86769]	[-1.20478]	[0.57074]	[0.24160]	[-0.76835]
EXPORT(-2)	3.93E-06	-7.69E-06	-9.01E-06	3.46E-05	8.65E-06	-8.25E-05	0.939604
	(5.6E-06)	(1.0E-05)	(1.6E-05)	(3.2E-05)	(2.5E-05)	(9.9E-05)	(0.92871)
	[0.70619]	[-0.74828]	[-0.55250]	[1.07733]	[0.35007]	[-0.83500]	[1.01174]
LIB	-0.000913	-0.003147	0.007882	0.023572	-0.017646	-0.055255	570.5249
	(0.00369)	(0.00683)	(0.01083)	(0.02133)	(0.01640)	(0.06557)	(616.509)
	[-0.24741]	[-0.46109]	[0.72784]	[1.10507]	[-1.07609]	[-0.84273]	[0.92541]
R-squared	0.976860	0.923241	0.908813	0.504013	0.397084	0.929428	0.483812
Adj. R-squared	0.963901	0.880256	0.857749	0.226260	0.059450	0.889907	0.194747

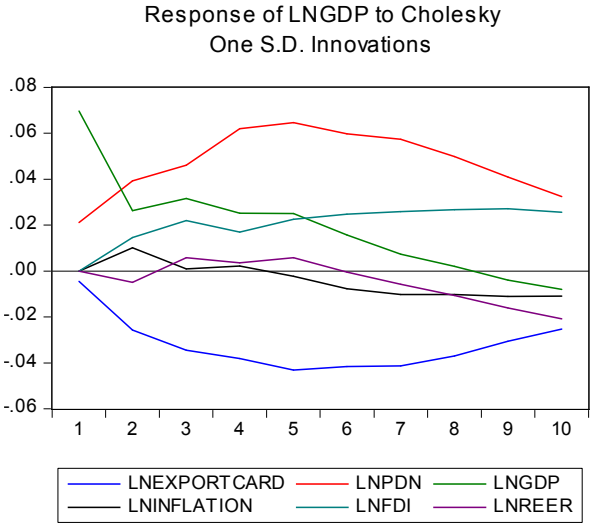
Sum sq. resids	0.056753	0.194137	0.488605	1.895806	1.120447	17.91211	1.58E+09
S.E. equation	0.047646	0.088122	0.139801	0.275377	0.211702	0.846454	7958.955
F-statistic	75.38326	21.47812	17.79738	1.814610	1.176080	23.51756	1.673711
Log likelihood	74.40105	49.80390	31.34408	4.227163	14.74549	-40.68949	-406.6396
Akaike AIC	-2.970052	-1.740195	-0.817204	0.538642	0.012725	2.784474	21.08198
Schwarz SC	-2.336723	-1.106865	-0.183874	1.171972	0.646055	3.417804	21.71531
Mean dependent	4.653438	22.68421	10.61116	10.17528	0.858300	20.13247	27547.30
S.D. dependent	0.250771	0.254657	0.370665	0.313061	0.218290	2.551076	8869.308
Determinant resid covariance (dof adj.)		0.000679					
Determinant resid covariance		2.53E-05					
Log likelihood		-185.5968					
Akaike information criterion		14.52984					
Schwarz criterion		18.96315					

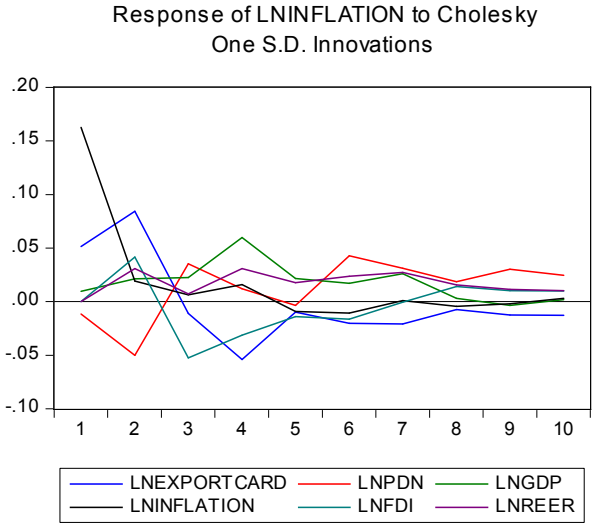


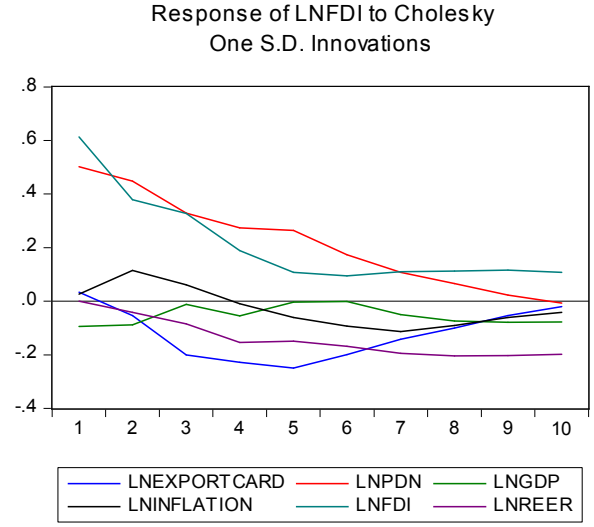
The above figures clearly show the export performance of Indian pepper in the coming years. The production of pepper which has shown a positive relationship with export in the model shows an increasing trend. Both the Export and production will increase by the year 2020. As far as the FDI is concerned there was a direct relationship between the two. Here as well in the forecasted results also they are showing an upward trend. The real effective exchange rate will come down as far as the analysis is concerned.

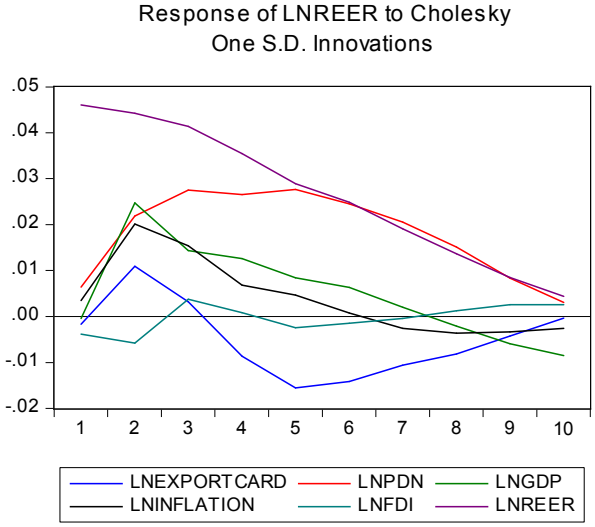












This upward trend should be taken in a positive way but at the same time, we have to pool the other destinations as well. Apart from the existing international markets, we have to see the upcoming markets and check the potential competitors. As far as the export of other spices is concerned, the threat of Guatemala is a serious one. Their productivity is much high. Even if there is a positive push serious measures have to be taken to improve the productivity as well.

CONCLUSION

- The results show that the liberalization has an important impact on the export of Pepper
- In the next few years export will increase.

With the liberalization policies, the exports of Pepper has decreased over a period of time. However, in the future, we may be experiencing an increasing trend in both the spices' export. Over the past decade and a half, the industry has experienced a variety of commercial and regulatory challenges. On the commercial side, there has been increased competition to sell certain commodities on international markets. This competition has periodically displaced parts of the Indian export basket, primarily due to local costs or prices. The dominant and relatively fast-growing Indian domestic market has created a strong and stable pull on Indian spice production, raising the costs of available raw materials for selected spices above the costs prevailing in China, Indonesia, Vietnam and elsewhere. The spice trade has long been a volatile one, and it is not possible to say whether relatively recent declines in India's world market share of several bulk spices will be a permanent trend. Even so, the steady growth in its domestic market suggests that this may well be the case. There is a growing recognition that India's future growth potential for spice exports lies most significantly in value-added and consumer products as opposed to bulk spices.

Reference

- Acharya, S.S., 1998. "Agricultural price policy and development: some facts and emerging issues", Indian Journal of Agricultural Economics, vol. 52, No. 1: 1-47.
- Agarwal, A. 1996. "My Story Today Your Story Tomorrow." In Down to Earth. New Delhi: Center for Science and Environment. American Spice Trade Association. 1999. "ASTA Cleanliness Specifications for Spices, Seeds, and Herbs." Washington, DC. 2000. Spice Statistics. Washington, DC.
- Ahluwalia, M.S., 1996. "New economic policy and agriculture: some reflections", Indian Journal of Agricultural Economics, vol. 51, No. 3, pp. 412-426.
- Alagh, Y.K. (1994) "Macro policies for Indian agriculture", in G.S. Bhalla (edited) 'Economic liberalisation and Indian agriculture', New Delhi: Institute for Studies in Industrial Development'.
- Anand Kumar Jaiswal WTO Agreement on SPS: Strategic Implications, (2003), , Printed in Economic and Political Weekly, India.
- Balakrishnan, P. (2000) "Agriculture and the economic reforms: Growth and welfare",'Economic and Political Weekly', March 18-24.
- Balakrishnan, P. and M. Parameswaran (2007) "Understanding economic growth in India: A pre-requisite", 'Economic and Political Weekly', July 14-20.
- Desai, M., 1999. "What should be India's economic priorities in a globalized world?", Indian Council for Research on International Economic Relations, New Delhi.
- Dr. R.V.Sujatha, Dr.K.Suhasini and Dr.Y.Eswara Prasad Structural Changes in Pepper Exports from India-An Econometric Analysis
- Dr. Tika Bahadur Karki,Reviewing the SPS Agreement: A Developing Country Perspective, (2002),
- Gulati, A., and A.N. Sharma, 1995. "Subsidy syndrome in Indian agriculture", Economic and Political Weekly, 30 September 1995.
- Jeromi, P.D. (2007) "Impact of agricultural trade liberalisation: Farmers' indebtedness and suicides in Kerala", Indian Journal of Agricultural Economics, April 1.
- Jha, V. 2002. "Strengthening Developing Countries' Capacities to Respond to Health, Sanitary, and Environmental Requirements: A Scoping Paper for South Asia." Geneva: UNCTAD.
- John,K.C. 2003. Spices export from India. Economic and Political Weekly.1832-1834
- Kalirajan, K.P., G. Mythili and U. Sankar, eds. 2001. Accelerating Growth Through Globalization of Indian Agriculture, Macmilan, India.
- Khan, M. 1990. Spices in Indian Economy. New Delhi: Academic Foundation.
- Kithu, C. (2000) "Issues on SPS and Environmental Standards for India." Presented at 5th World Spice Congress. Cochin, India.
- Kruger, A.O., M. Schiff and A. Valdes, eds. 1991. The Political Economy of Agricultural Pricing Policy, vols. 1 and 2 (Baltimore, John Hopkins University Press).
- Little, I. T. Scitovsky and M.Fg. Scott (1970) 'Industry and Trade in Some Developing Countries: A comparative study', Paris: OECD.
- Madan, M., and M. Selvan. 2001. "Globalisation and Spice Economy of India." Indian Journal of Arecanut, Spices and Medicinal Plants 3 (4): 262–69.
- Mehta, R., M. Saqib, and J. George. 2002. "Addressing Sanitary and Phytosanitary Agreement: A Case Study of Select Processed Food Products in India." RIS-DP #39/2002. New Delhi:
- Mellor C J 1984 An application and extension of the Markov chain model to cereal production. Journal of Agricultural Economics 35(2): 203-218.

- Michael E. Porter, Christian Ketels and Mercedes Delgado, “competitiveness is a country’s share of world markets for its products”
- Michael Friis Jensen, CDR Working Paper, Centre for Development Research, Copenhagen Sanitary and Phytosanitary Measures in SAARC Countries, (2002), South Asia Watch on Trade, Economics and Environment (SAWTEE) and CUTS Centre for International Trade, Economics and Environment (CUTS-CITEE)
- Mishra, V.N. (2004) 'The State of the Indian Farmer: A Millennium Study', volume 15, "The Terms of Trade", New Delhi: Academic Foundation and Ministry of Agriculture.
- Mohammed Saqib Setting the House in Order: a Study on Technical Standards that Affect Indian Agriculture Trade, (2003), , Working Paper on Agriculture and Poor, Bazaar Chintan, IDE India.
- Mohan, R. (2008) "The growth record of the Indian economy 1950- 2008: A story of sustained saving and investment', keynote address, Conference on 'Growth and Macroeconomic Issues and Challenges in India', Institute of Economic Growth, New Delhi, February 14, 2008.
- Nayyar, D. and A. Sen (1994) "International trade and the agricultural sector in India", in G.S. Bhalla (edited) 'Economic liberalisation and Indian agriculture', New Delhi: Institute for Studies in Industrial Development'
- Nishita Bakshi, Sanitary and Phytosanitary Measures: The Case of Mexican Avocados, (2003), Thesis submitted to the Faculty of the Virginia Polytechnic Institute and State University
- Pal, S. and A. Singh (1997) 'Agricultural research and extension in Agricultural Growth In India Since 1991 41 India: Institutional structure and investments', Policy Paper No. 7, New Delhi: National Centre for Agricultural Policy.
- Pruthi, J.S. 1976. Spices and Condiments. New Delhi: National Book Trust. 1998
- R. K. Bhardwaj, M. Patel, R. Arya and S. K. Singh. (2008). Integrated farming-practices and potentials for food safety. Proceedings of International Symposium on “Food Safety, Quality Assurance and Global Trade: Concerns and Strategies” College of Veterinary and Animal Sciences, G.B.P.U.A & T, Pantnagar. (INDIA) and College of Veterinary Medicine, Michigan State University. (USA), Nov .7-9, p.169.
- R. K. Bhardwaj, N. K. Singh, Saurabh Singh and Ashutosh Singh. (2009).Greening the supply chain for marine food products: Emerging issues and Policies. Souvenir & Abstracts. National Symposium on “Organic livestock farming-Global issues, Trends & Challenges.”W.B.University of Animal & Fishery Sciences, Kolkata, Feb.26-28.p-38.
- Rajesh Mehta and J George, Implementation Issues in SPS: A Developing Country Perspective for Development Agenda on the Meandering Pathways from Doha to Cancun (2003), a RIS Discussion Paper.
- Rajesh Mehta and J George, Institutional and Legal Framework of SPS in India (2003), New Delhi Workshop on International Food Safety Regulations and Processed Food Exports. International Harmonization of SPS Standards, Paper submitted by India in the WTO Committee on Sanitary and Phytosanitary (SPS) Measures, Indian Embassy.
- Rao, A., and P. Rao. 2000. “Study on Pesticide Residues in Vegetables.” Pollution Residues 19 (4): 661–64.
- Schumacher, Jr., A., 2000. “International agricultural trade at a crossroads”, Economic Perspectives, An Electronic Journal of the US Department of State, March 2000.
- Sen, A. and M.S. Bhatia (2004) 'The State of the Indian Farmer: A Millennium Study', volume 14, "Cost of Cultivation and Farm Income", New Delhi: Academic Foundation and Ministry of Agriculture.
- Shand, R., 1997. ‘The agriculture-manufacturing nexus and sequencing in India’s reform process’, Discussion Paper No. 4, Australia-South Asia Research Centre, Australian National University.
- Singh, M. (1995) Inaugural Address, Fifty-Fourth Annual Conference of the Indian Society of Agricultural Economics, Kolhapur, 26 November 1994, reprinted in 'Indian Journal of Agricultural Economics', 50, 1-6.
- Singh, M., 1995. Inaugural address delivered at the 54th Annual Conference, Indian Journal of Agricultural Economics, vol. 50, No. 1: 1-6.
- Sivadasan, C., and P. Kurup, eds. 2002. “Quality Requirements of Spices for Export. Spices Board of India.” Cochin.
- Sivakumar, S.D., R. Balasubramaniam and N. Srinivasan, 1999. “Growth linkage effects of agro-industrialization”, Indian Journal of Agricultural Economics, vol. 54, No. 3, pp. 412- 419. UNCTAD, 1999. Trade and Development Report, Geneva.
- Spencer Henson, Rupert Loader, Alan Swinbank, Maury Bredahl, The Impact of Sanitary and Phytosanitary on Developing Country Exports of Agricultural and Food Products, (1999), Presented at The Conference on Agriculture and The New Trade Agenda in the WTO 2000 Negotiations
- Technology for Black Pepper.” Indian Journal of Arecanut, Spices and Medicinal Plants 4 (2): 77–80. SJ, Loader RJ, Swinbank A, Bredahl M, Lux N Impact of Sanitary and Phytosanitary Measures on Developing Countries, Henson, Department of Agricultural and Food Economics, University of Reading
- Vaidyanathan, A. (2007) 'Water policy in India: A brief overview', Occasional Paper Number 6, Centre for

Public Policy, Indian Institute of Management, Bangalore.
- Veena, U.M. 1992. "An econometric analysis of Indian coffee exports". An unpublished M.Sc. (Agri) Thesis, submitted to University of Agricultural Sciences, Bangalore.
- Yamada, Saburo. 1994. Manual for Measurement and Analysis of Agricultural Productivity. Asian Productivity Organization. Tokyo, Japan.

Websites:
- www.vigyanprasar.com
- www.indianspices.com
- www.etagriculture.com/nov_dec2002/cover.html
- www.p-maps.org/mns/example_reports/sw2302
- www.indiaonestop.com/markets/spices/spices.htm
- www.itdg.org/docs/technical_information_service/turmeric.pdf
- www.primaryinfo.com/turmeric.htm
- http://finance.indiamart.com/markets/commodity/turmeric.html
- http://www.wholehealthmd.com/refshelf/foods_view.html
- www.indiancommodity.com/spices/spchilli.htm
- http://www.food.gov.uk/foodindustry/guidancenotes/foodguid/sudanguidance.
- www.indiainfoline.com.

Reports:
- Annual Report, (1999-00), Ministry of Food Processing, Government of India.
- Annual Report, 2003-04, Ministry of Food Processing Industries, Government of India.
- Annual Report, 2010-11, Ministry of Food Processing Industries, Government of India.
- Annual Report, 2012-13, Ministry of Food Processing Industries, Government of India.
- Centre for the Promotion of Imports from Developing Countries. 2002. "EU Market Survey: Spices and Herbs." Rotterdam. Commodity Research Bureau. 2003. CRB Commodity Yearbook 2003. Hoboken, NJ: John Wiley and Sons.
- Delegation of South Africa. 2004. "Consideration of the Elaboration of MRLs for pices." Presented at Codex Committee on Pesticide Residues Thirty-Sixth Session. New Delhi. April 19–24.
- Food Standards Agency. 2004. "Guidance Notes on Sudan Dyes in Chili Imported from India."
- India Infoline. 2001. Sector Report: Agrochemicals.
- International Trade Centre. 1996. "The Global Spice Trade and the Uruguay Round Agreements." Geneva.