

An Econometric Analysis of Instability in Indian Spices Exports

Dr.D.Srinivasa Rao

Associate Professor of MBA, KL U Business School, KL University, Andhra Pradesh
dasaraju_srinivasarao@yahoo.co.in

Abstract

Export instability is major problem that is halting the growth of Indian spice trade. Identifying the determinants of export instability may help in formulating appropriate policies that may at least reduce the intensity of the problem. Cointegration regression was the preferred method due to the stationarity problem associated with the time series data. Results confirm that apart from the traditional factors, supply side factors are also causing the instability

Key Words: *Export Instability, Commodity Concentration, Geographical Concentration, Cointegration.*

Introduction

Traditionally agricultural sector has been playing a key role in the composition of Indian exports. Apart from earning valuable foreign exchange, agricultural exports also play a significant role in employment generation both directly and indirectly in rural areas, thus contributing to increase in incomes of small and marginal farmers and landless labour. Spices are an important component of Indian agriculture trade portfolio with a weight of about 8 percent. Spices constitute an important group of agricultural commodities which are used for flavouring and are the main ingredients for any tasty food. India exports spices from times immemorial and for a very long time has been among the leading spice exporting countries of the world. Today, India is the largest producer, consumer and exporter of spices in the world. The production of spices during 2010-11 is around 5.3 million tons and the total area under spices cultivation is about 2.9 million hectares. Almost all the states and union territories of the country produces one or the other spices. On average 8 to 10 percent of the spices production is exported and the rest is domestically consumed. Even with this minimal exports of spices, India earns about \$1 billion to \$1.25 billion per annum.

In the context of Economic Liberalisation in

India and the operationalisation of WTO at the global level, Indian agricultural exports in general and spices exports in particular are facing a number of challenges. Despite these challenges Indian spices earned \$ 1.25 billion export revenue during the year 2010-11. Given the traditional comparative advantages of Indian spices sector, it is recognized as one of the areas where there is tremendous potential for growth in the coming years. Hence, India is aiming to become a global processing hub of spices and planning to set up 6 to 7 Spice Parks in major growing centers and targeting at a foreign exchange earning of \$5 billion by the year 2017. However, instability in export earnings is a major problem that is retarding the growth performance of Indian spices export sectors. The main reason for instability in export earnings is believed to be high dependence on selected few commodities (commodity concentration) and markets (geographical concentration). Instability in export earnings strongly affects farmers incomes and their living conditions. They have hardly any instruments at their disposal to hedge against the adverse effects of instability of export earnings, leading to significant dislocations in domestic investment and production activities. Also, the various policy measures to promote spice exports become ineffective and uncertain in the context of

instability in export earnings. In this context the present paper aims at identifying the major factors that are causing instability in Indian spices export earnings using cointegration regression analysis. The paper is organized as follows. Section 2, gives an overview of the growth experience of Indian Spices sector. Section 3 provides the conceptual framework for the study, Section 4 is the survey of literature on export instability and the hypotheses to be tested are stated in section 5. Section 6 outlines the research methodology and section 7 provides the data sources for the study. Section 8 is the presentation of empirical results and the validation of stated hypothesis is made in section 9. Section 10 is a brief summary of the study.

2. Growth Trends of Indian Spice Exports

India exports spices from times immemorial and is the largest producer, consumer and exporter of spices in the world. India commands a formidable position in the World Spice Trade with 48% share in Volume and 44% in Value. India exports about 180 varieties of spices to over 150 countries around the world. Mint products account for the bulk of spice exports from India, followed by chillies, oils and oleoresins and pepper. The Major importers are USA, EU, Japan, Malaysia, China, Pakistan, UAE, South Africa and Japan. In 2010-11 the export of spices from India has been 525,750 tons valued Rs.6840.71 crores (US \$ 1502.85 Million) as against 502,750 tons valued Rs.5560.50 crores (US \$ 1173.75 Million) in 2009-10. Because of strong domestic market India could exports on average about 8 to 10 percent of its spices production. Spices constitute about 1.2% of the total Indian Merchandise Exports during the year 2007-08. The share of spices in export earnings from agricultural and allied products is about 8% during the same year.

Over the last fifty years (1960-2010) the spices exports of India show positive trend both in terms of volume and value (fig 1). Spice exports remained almost flat during the first two decades of the five decades under consideration. The

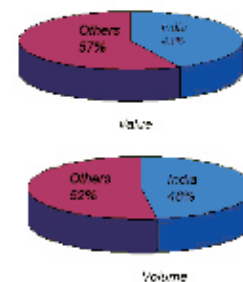
positive growth trend in spices exports is quite visible during the eighties and it seems that the Economic Reforms Period (1990- 2010) gave boost to Indian spice trade. However the growth in exports is accompanied by instability as seen by the ups and downs in the growth curves (Fig.1).

3. Conceptual Frame Work

Simply the year to year fluctuations in export revenue (merchandise or merchandise plus services) is defined as export instability. Mathematically, it can be defined as sizable, short term movements of export revenue from their growth trend (linear or exponential). According to UN 1, exports earnings instability index is the absolute difference in the value of exports from year to year, expressing this difference as a percentage of larger of the two. Thus, export instability is basically concerned with fluctuations around the trend of export earnings.

We know that export revenue is the product of export volume and export price. There fore, export instability defined as the instability in export revenue could be partly due to instability in the export prices and partly due to instability in export quantities. These fluctuations in price and volumes do not arise randomly but reflect underlying changes in demand and supply conditions and their respective elasticities. The supply conditions are generally influenced by domestic factors, whereas the demand conditions are influenced by international factors. Apart from supply and demand factors, export instability may be affected by trade policies of the trading partners, rules of trading system, market imperfections etc

India's Share in World Spice Trade



4. Survey of Literature

There has been a widely held view that primary goods exports suffer more instability compared to industrial goods and therefore developing countries suffer from more export instability than developed countries. Since export earnings of developing countries depend on only a few number of commodities and their sales are geographically concentrated it is believed that such commodity and geographic concentration is the major cause for the instability in their export earnings. It is often postulated that countries having large product concentration in their export basket (commodity concentration) experience large export instability because concentration on a few commodities reduces the chances of having fluctuations in one direction in some of its exports offset or ameliorated by counter fluctuations or stability in others.² An analogous argument is made with respect to geographical concentration. For example, Massell (1962) argues that high geographical concentration is likely to imply greater dependence on economic conditions in one or few countries. Fluctuations in demand in any recipient country will then have a more pronounced effect on the receipts of the exporting country than if receipts were more diversified among recipients. From these arguments it is clear that export instability can be reduced by product diversification and geographical diversification. However, there is no-a-priori theoretical foundation for this kind of relationship between diversification and instability and it needs to be empirically verified in different situations. Empirical evidence on this relationship is mixed. Studies of Coppock, (1962), Massell, (1964) and Macbean, (1966) found negative relationship between export instability and geographical concentration. Later studies by Naya(1973), Kalaf (1974) and Kingston (1976) have found geographical concentration to be an insignificant explanatory variable although it is positively linked with export instability. But recent studies like that of Love (1985), Paudyal (1988), Tegegne (2000) Campa (2004) using time series data on

an individual country basis found that there is significant relationship between concentration and export instability. Thus, it is clear that the empirical evidence on the nexus between concentration and export instability is inconclusive. Most of the available time series studies do not address the problem of non-stationarity nature of the data. Hence it may be possible that these estimates are result of spurious regression.

Based on the above survey of literature the following determinants of export instability were identified i) Commodity concentration of exports ii) Geographical concentration of exports iii) Relative instability of the major commodity (iv) Internal supply conditions (v) International demand conditions

5. Specified Hypotheses for Export Instability of Spices

Indian spices exports are experiencing high levels of instability.

- i. Commodity concentration of Indian spices exports has a positive impact on exports instability.
- ii. Geographical concentration of Indian spices exports is directly related to export instability
- iii. Instability in Pepper's exports is causing instability in total spices export earnings.
- iv. Instability in total output of spices has a direct impact on instability of spices exports.

6. Research Methodology

In-line with the established practice in this field, the Instability in export value of spices is hypothesized to be a function of the degree of Commodity Concentration and Geographical Concentration, Instability in production, instability in exports of major items, etc. Commodity Concentration and Geographical Concentration of spices exports by value were measured by the well known Gini- Hirschman's Concentration Index. In order to understand clearly the nature of inter- relationship between the causes of export instability and measure of

instability, Multiple Linear Regression Analysis is done within a cointegration framework. Cointegration framework is warranted to handle the problem of non-stationarity associated with the time series data which may lead to spurious regression. The Indian spices export instability function in a double log linear form can be specified as follows:

$$\ln(\text{ISE}_t) = \beta_0 + \beta_1 \ln(\text{CC}_t) + \beta_2 \ln(\text{GC}_t) + \beta_3 \ln(\text{IP}_t) + \beta_4 \ln(\text{IO}_t) + \epsilon_t \text{ -----(1)}$$

Where,

ln = natural logarithm,

ISE = Index of instability in spices exports,

GC = Geographical Concentration

IP = Instability index of Pepper output,

IO = Instability Index of total spices output

and $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4$ are the coefficients to be estimated

7. Data Sources

The study is based on the secondary time series data (1980-2010) obtained from the following sources. i) Spices Statistics (various issues), Spices Board, Ministry of Commerce and Trade, Government of India, Cochin. ii) Monthly Statistics of Foreign Trade of India, DGCIIS,

Government of India, Kolkatta

8. Empirical Results and Discussion

Before applying the cointegration tests, we shall first carry out the unit root tests of the time series properties of the concerned variables outlined by equation (1). For each series, we examine the time series properties of the macro variables using the Augmented Dickey-Fuller unit root test (with trend and intercept) on both levels and first differences. Results from the unit root tests were presented in Table.1 and they provide strong evidence of nonstationarity of variables at levels as the estimated statistic for all these variables does not exceed their critical values at standard significance level. However the unit root tests for the variables in first differences confirms our assertion that the all the series are nonstationary at levels but are stationary in their first differences. Therefore, we conclude that all the series contain a single unit root. Since all the variable appear to have a unit root, testing for cointegration is feasible. Thus the estimated equation corresponding to equation (1) is as follows

$$\ln(\text{ISE}) = 1.21 \ln(\text{CC}) + 3.02 \ln(\text{GC}) -$$

$$(1.89) \quad (2.14)$$

$$0.25 \ln(\text{IP}) + 2.56 \ln(\text{IO}) \text{ --- (2)}$$

$$(0.09) \quad (2.08)$$

Table.1

Augmented Dickey-Fuller Unit Root Test Results

Variables	At levels	At First differences	Conclusion
LISE	-1.34	-4.29	I(1)
LCC	-2.08	-4.41	I(1)
LGC	-2.76	-4.56	I(1)
LIO	-2.16	-5.01	I(1)
LIP	-2.65	-5.89	I(1)

At levels
 1% Critical value -3.96,
 5% Critical value -3.41

At first differences
 1% Critical value -3.98
 5% Critical value -3.52

Based on the above empirical analysis of the relationship between instability of Indian spices exports and its various determinants, the following findings are made:

- i. There is a long run equilibrium relationship between the instability of Indian spices exports and its determinants, viz., Commodity Concentration of exports, Geographical Concentration of exports, Instability in pepper exports and Instability in spices production.
- ii. Commodity concentration of Indian spices exports is related directly with spices export instability.
- iii. Geographical concentration of Indian spices exports has a significant positive impact on its export instability.
- iv. Instability in production of spices is found positively related with the level of instability in exports of spices.
- v. Instability in production of spices is found positively related with the level of instability in exports of spices.
- vi. Instability in pepper exports is found not significant in explaining instability in total spices exports

9. Testing of Hypotheses

- i. In the light of our above findings, we accept the second hypothesis that commodity concentration of Indian spices exports is directly related to instability in spices exports as the estimated elasticity is positive and statistically significant.
- ii. The third hypothesis that Geographical Concentration of Indian spices exports has positive influence on export instability is also accepted as it is clear from our findings that it has statistically significant positive elasticity with respect to export instability.
- iii. Regarding the fourth hypothesis that the instability in pepper exports is causing instability in total spices exports, our findings did not support it as the estimated

coefficient is not statistically significant. Thus, we reject the null hypothesis that instability in pepper's exports is responsible for instability in total spices exports.

- iv. The fifth hypothesis that instability in total output of spices is directly related to instability in spices exports is accepted. The estimates show a statistically significant positive relationship between instabilities of output and exports of spices.

10. Conclusion

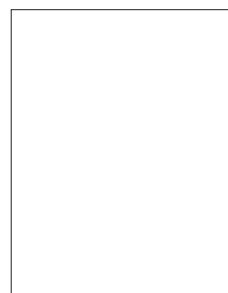
The present paper is an attempt to explain the various determinants of export instability of Indian spices trade. Based on review of literature a set of determinants of agricultural exports were identified and a model was developed in the cointegration framework to estimate it with time series data for the period 1980 to 2010. The empirical results shows that commodity concentration, geographical concentration Indian spice exports apart from supply side factors are causing the value of Indian spice exports to fluctuate leading to their constrained growth. However as the size of the sample is small, in depth of study of the dynamics involved is not meaningful.

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AUTHOR’S PROFILE



Dr.D.Srinivasa Rao is currently working as an Associate Professor in KL University School, KL University, Vaddeswaram, Andhra Pradesh. He holds a doctoral degree in Econometrics and his teaching areas are, Quantitative Techniques, Macro Economics and Research Methodology. His research interests in the areas of Econometrics and Research Methodology. He has eight research papers in national and international journals.