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Analysis of Revealed Comparative Advantage in Export of India's Agricultural Products

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ANALYSIS OF REVEALED COMPARATIVE ADVANTAGE IN EXPORT OF INDIA'S AGRICULTURAL PRODUCTS

Subhash Jagdambe∗

Abstract

This paper analyses the competitiveness of India's agricultural products in world markets. Four indices of Revealed Comparative Advantage (RCA) were used at the four-digit level of Harmonised System (HS) of Classification for the period 2001 to 2013. Under live animal products, 7 out of 26 products showed Revealed Comparative Advantage. For vegetable products, 19 out of 58 showed strong Revealed Comparative Advantage. For products like animal or vegetable fat and prepared foodstuff, 3 out of 16 and 8 out of 49 showed Revealed Comparative Advantage respectively. Furher, the consistency tests reveal that the indices are less satisfactory as cardinal and ordinal measure but relatively satisfactory as dichotomous measure. Dichotomous measures are useful in identifying whether India has a comparative advantage in a particular product. The study has also found the pattern of RCA indices to be fairly stable over the years.

JEL: F1, Q1

Keywords: Revealed Comparative Advantage, Consistency Test, Agriculture, India World.

Introduction

The growth in international trade has been quite impressive in the last two-and-a-half decades due to falling trade costs and lower trade barriers. The reduction in trade barriers will lead a country towards its comparative advantages; it results in more competitive pressures and the transfer of factors of production, leading to productivity gains from trade. In the early nineties, India introduced a series of economic reforms to open up the economy. Among the major reforms were the extensive efforts to liberalise trade. It was expected that the liberalisation in trade would change the composition of exports and reflect India's comparative advantages in the global market. Further, "a country's comparative advantage in international trade may be influenced by differential rates of change in accumulation of production factors or due to the increased trade integration of other countries" (Batra and Khan 2005). However, the agriculture sector has been excluded from these major economic reforms even though it has been playing a vital role in India's economic development in terms of providing employment and food, and earning foreign exchange. Hence, this issue provides ample grounds to study the competitiveness of Indian agriculture in the world market and understand which products enjoy a comparative advantage. Keeping this view in mind, the present study attempts to examine the comparative advantages of India's agricultural sector with respect to the world during the study period.

This paper is organised as follows: the first section gives an overview of Indian agricultural trade over the last decade. Section two presents a brief review of existing literature, section three

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discusses the data and methodology used for the analyses of comparative advantage, section four presents the results of the study and the last section summarises and concludes the study.

Overview of Indian Agriculture Trade

Agriculture is one of the main pillars of Indian economy and provides livelihood to more than 54 per cent of the rural workforce (Government of India, 2011). It is an important source of raw material for industries such as textiles, sugar, jute and many food processing industries. Further, balance of trade in agriculture has remained consistently favourable over the years. Despite its falling share in gross domestic product (GDP) – from 54.66 per cent in 1950-51 to 13.07 in 2012-13 (GoI, and Agriculture Statistics at a Glance) – it still contributes around 12.70 per cent of the total export earnings in 2013. In this context, the present study analyses India's comparative advantage in export of agricultural products at the global level.

In the last decade, the Indian agriculture sector has shown an outstanding improvement in the volume of trade with the world, which has increased from US $ 9.91 billion in TE2003 to US $ 52.99 billion in TE2013. It can be observed from Table 1 that the value of agricultural exports has increased from US $ 6.66 billion to US $ 36.24 billion over the study period. The imports also increased from US $ 3.25 billion to US $ 16.75 billion during the same period.

Table 1: Trends of Agriculture Trade (US $ billions)

Year	Agri. Export	Agri. Import	Agri. Trade Balance	Total National Export	Total National Import	Total National trade Balance	% share of Agri. Export to Total National Export	% share of Agri. Import to Total National Export
TE2003	6.66	3.25	3.41	51.11	60.19	-9.07	13.03	5.41
TE2006	9.67	4.78	4.89	99.15	139.35	-40.2	9.75	3.43
TE2009	15.91	8.23	7.68	168.17	266.92	-98.74	9.46	3.08
TE2013	36.24	16.75	19.5	309.22	472.47	-163.26	11.72	3.54

Source: Author's calculation based on HS 4-digit level data sourced from ITC database.

Note: Agri. - Agriculture.

One important point we can see from the Table is that India's agriculture trade balance was always in favour of India but the total national trade balance was negative and unfavourable for India during the study period. It implies that Indian agriculture has a very important role in reducing the total national balance of payments deficit. The agriculture trade balance has been increasing over the years from US $ 3.41 billion in TE2003 to US $ 19.50 billion in TE2013. In contrast, the total national trade balance has been increasing negatively - from US $ -9.07 billion to US $ -163.26 billion over the study period. On the other hand, the percentage share of agricultural exports and imports in total national exports and imports has increased over time. The percentage share of agricultural exports to total national exports decreased from 13.03 per cent in TE2003 to 9.75 per cent in TE2006 but after that it

showed a gradual increase to 11.72 per cent in TE2013. The percentage share of imports to total national imports also decreased from 5.41 per cent in TE2003 to 3.43 per cent in TE 2006 but thereafter it has shown an increasing trend (Table 1).

Review of Literature

This section provides a brief overview of selected studies done using RCA index to evaluate the competitiveness of India's agricultural products.

In international trade literature, there are two prominent theories on comparative advantage: the Ricardian theory and the Heckscher and Ohlin (H-O) theory. Ricardo (1817), states that absolute production cost difference rather than comparative cost difference is the reason for international trade. However, the H-O theory states that the difference in factor prices across countries is the reason for international trade.

In brief, the comparative advantage in classical trade theories is determined by pre-trade relative prices. In autarky, a country has comparative advantage in a particular good if the relative price of domestic goods is below its relative price in the world market. These pre-trade relative prices depend on the relative cost of production. Traditional measures of comparative advantage are based on the comparison of pre-trade relative costs. However, due to the absence of observable data on relative prices and/ or costs, Balassa (1965) has introduced an alternative approach to calculate comparative advantage. This is called the Revealed Comparative Advantage (RCA) index.

Balassa (1965) first calculated RCA index empirically. It had been changed several times (1977, 1979 and 1986). Balassa used post-trade data to calculate the RCA index. The index does not determine the sources of comparative advantage; rather, it tries to identify whether a country has Revealed Comparative Advantage or not. The formula is defined as a commodity's share in total national exports divided by its share in total world export. If the RCA value of a commodity is greater than one, it indicates that a particular commodity has comparative advantage in exports. If the value is less than one, it indicates that the commodity is at a comparative disadvantage in exports. The RCA index has been widely used to analyse changes in trading patterns (Ferto and Hubbard 2003, Batra and Khan 2005, Kannan 2010).

Ballance *et al* (1987) give a simple theoretical relationship between the theoretical notion of comparative advantage and the practical measurement of comparative advantage that we obtain practically. The following diagram shows the relationship:

EC→ CA→TPC→RCA.

The economic conditions (EC) that vary across countries determine the international pattern of comparative advantage (CA) which relies on the pattern of international trade, production and consumption (TPC) which we use to calculate the actual measure of RCA Index. The RCA indices that have been suggested in order to identify the underlying pattern of CA are constructed from TPC and possibly other post-trade variables (Sanidas E and Shin, Y 2010).

A Ferto and Hubbard (2002) study used modifications of the RCA index was developed by Vollrath, (1991) namely, the *Relative Trade Advantage*, the *logarithm of the Relative Export Advantage*

and *Revealed Competitiveness*. They used data at 4-digit level of Standard International Trade Classification (SITC) for the period 1992 to 1998 for agro-based products. In fact, they explore the competitiveness of Hungarian agriculture with the EU as its competitor. They found that in spite of changes in the agricultural scene of Hungary, the pattern of Revealed Comparative Advantage had remained stable.

Further, another important study done by Oduro and Offei (2013) used four RCA indices and a consistency test for Revealed Comparative Advantage indices to investigate Ghana's Revealed Comparative Advantage in agro-processed products. They analysed 69 agro-processed products from 2004 to 2011 and found that only 9 agro-processed products in Ghana have comparative advantage. Also, the share of agro-processed products in which Ghana has comparative advantage declined over the years. Finally, the consistency result showed that the four indices of RCA are less consistent as cardinal and ordinal measure but relatively fairly consistent as a dichotomous measure. This implies that the RCA measures are useful indicators in determining whether Ghana has a comparative advantage or disadvantage in agro-processed products.

Finally, Ufuk Bebek (2011) evaluated the recent proposed additive measure of Revealed Comparative Advantage index as an alternative to the Balassa (1965) index. He provides a framework to assess their applicability by means of their consistency across various dimensions. He found that these indices are less consistent with the level of deviation from comparative neutral level as cardinal and ordinal measures and that this less consistency is due to the inappropriate normalisation of those deviations.

Data and Methodology

This paper is based on export and import data as per the Harmonised System (HS 2007) at four-digit level of classification. The entire data, sourced from International Trade Centre (ITC), covers the 13-year period from 2001 to 2013 because it is only from 2001 onwards data are available on the ITC database. For this analysis, we look at HS chapter 01-24 on agriculture sector covering 149 products at four-digit level and grouped[1] into four categories. These categories are:

(1) Live animal products
(2) Vegetable products
(3) Animal or vegetable fat products
(4) Prepared foodstuff products

Under the category of live animal, 26 products were analysed while 58 products were analysed in the category of vegetable products, 16 under the category of animal or vegetable fat products and 49 under the category of prepared foodstuff products. The study used a widely accepted tool in international trade literature to analyse the comparative advantage. Developed by Balassa (1965), it is known as RCA index, which can be expressed as

[1] *The study uses the HS classification for grouping of products.*

$$RCA^1_{ij} = (X_{ij} / X_t) / (X_{wj} / X_{wt}) \quad (1)$$

Where

RCA^1_{ij}= Revealed Comparative Advantage for country *i* in product *j*.

X_{ij} = value of country *i*'s export of product *j*;

X_i = value of country *i*'s total agriculture exports;

X_{wj} = value of world export of product *j*;

X_w = value of world total agriculture exports;

The index shows how a product is competitive in a country's exports compared to the product's share in another country or group of countries. A product with a high RCA is competitive and can be exported to countries with a low RCA. Countries with similar RCA profile are likely to have high bilateral trade intensities unless intra-industry trade is involved (Chandran, 2010). Under the assumption that the commodity pattern of trade reflects inter-country differences in relative costs as well as non-price factors, the index is assumed to "reveal the comparative advantage of the trading countries (Shinoj & Mathur, 2008)". The advantage of using the RCA index is that it considers the intrinsic advantage of a particular export commodity and is consistent with the changes in an economy's relative factor endowments and productivity. The disadvantage, however, is that it cannot distinguish between improvements in factor endowments and the pursuit of appropriate trade policies by a country (Batra & Khan, 2005). The RCA index value ranges between zero (0) and positive infinitive (+∞). If the RCA index value of a country is greater than one, the country has comparative advantage in those products, and vice versa.

However, RCA suffers from the problem of asymmetry as 'pure' RCA is basically not comparable on both sides of unity as the index ranges from zero to one if a country is not specialised in a given commodity while it ranges from one to infinity if a country is specialised. Some procedure has been proposed to alleviate the problem of asymmetry, such as the logarithmic transformation of the Balassa measure (Vollarth 1991).

Vollrath (1991) proposed three alternative measures of Revealed Comparative Advantage. These are as follows:

(1) The Relative Trade Advantage (RTA) index is expressed as the difference between Revealed Export Advantage (RXA) and Revealed Import Advantage (RMA)

$$RCA^2_{ij} = RTA_{ij} = RXA_{ij} - RMA_{ij} \quad (2)$$

Where

$$RXA = (X_{ij} / X_t) / (X_{wj} / X_{wt}), \; RMA = (M_{ij} / M_t) / (M_{wj} / M_{wt})$$

RCA^2 = second measure of revealed advantage

M = Imports, and X = Exports;

(2) The second alterative measure proposed by Vollrath is the logarithmic transformation of the RCA^1 and is expressed as follows:

$$\mathbf{RCA^3 = \mathit{ln}\ (RXA_{ij})} \qquad \mathbf{(3)}$$

RCA^3 = third measure of revealed advantage

(3) The third alternative measure proposed by Vollrath is Revealed Competitiveness (RC), which is expressed as the difference between the logarithms of relative export advantage and the relative import advantage and expressed as follows:

$$\mathbf{RCA^4 = RC = \mathit{ln}\ (RXA^1_{ij}) - \mathit{ln}\ (RMA_{ij})} \qquad \mathbf{(4)}$$

RCA^4 = the fourth measure of revealed comparative advantage

A positive value of RTA, *ln* (RCA) and RC indicate the Revealed Comparative Advantage whereas a negative value indicates the revealed comparative disadvantage. This paper employed all the four Revealed Comparative Advantage indices mentioned above (equation 1 to 4) to estimate India's Revealed Comparative Advantage in agricultural products.

The study conducted consistency tests for Revealed Comparative Advantage indices proposed by Ballance (1987). These are the cardinal measures, ordinal measures and dichotomous measures. He pointed out that the RCA indices can be interpreted in three ways: RCA can provide information regarding the degree of comparative advantage a product has compared to another product (cardinal interpretation); the products may be ranked on the basis of their Revealed Comparative Advantage (ordinal interpretation); and the products can be classified into two groups based on their Revealed Comparative Advantage or disadvantage (dichotomous interpretation). The cardinal measure is based on correlation coefficient between paired indices over the period. The ordinal measure is based on rank correlation coefficient between paired indices over the period. The dichotomous measure is based on a share of product groups in which both of the paired indices suggest a comparative advantage or comparative disadvantage (Andhale and Kannan, 2015).

Further, the study used various measures to check the stability of the indices. The first indicator of stability in RCA is the coefficient of variation and the second indicator of stability is the correlation between the index in a time period t and the index in subsequent time periods. Using TE2003 as a base year, the correlation coefficient for four indices for India over the years (TE2006, TE2009 and TE2013) is calculated.

Finally, the study used the distribution of the RCA^1 index (Balassa index) to check whether India's RCA in agricultural products has improved or weakened over the period using the method developed by Hinloopen and van Marrewijik (2001).

Empirical Finding

(A) Revealed Comparative Advantage

(1) Live animal products: The four RCA indices estimated for live animal products over the period TE2003 to TE2013. The present study considered 26 live animal products out of which 7 have shown Revealed Comparative Advantage. Table 1a appendix shows the four indices of RCA values for live animal products along with the average value and coefficient of variation.

The estimated results of the RCAs for fish frozen (0303) shows that India has Revealed Comparative Advantage in exports in this product. For crustaceans (0306) the value of RCAs was found to be high during the initial period of study but it gradually declined in the subsequent period. The estimated values of RCAs for bones and horn-cores degelatinised (0506) were very high in TE2003 but have declined in the subsequent period under consideration. Molluscs (037), birds egg in shell (0407), ivory (0507) and bile and other animal glands for pharmaceutical preparation (0510) too had comparative advantage for India in exports over the study period. However, the value of RCAs for these products was found to be declining over the study period. Overall, the average value of RCA[1] trended up over the period under consideration. It implies that India had comparative advantage in export of live animal products during TE2003 to TE2013.

(2) Vegetable products: Interesting results were found for vegetable products. The RCA values for some products were stable over the study period whereas some others showed increasing and decreasing trends. The study analysed 58 products under the category of vegetable products, out of which for 19 products, all the four indices had strong Revealed Comparative Advantage in exports. Table 2b appendix shows the four indices of RCA values for vegetable products along with the average value and coefficient of variation.

RCA values were stable for dried vegetables (0712), pepper, pepper and capsicum (0904) and rice (1006). For products like seeds of anise, badian, fennel, coriander, cumin etc. (0909), vegetable saps and extracts (1302) the values of RCAs have increased over the study period. It implies that India is gaining in export of these products. But products such as foliage, branches (0604), onions, garlic and leeks fresh or chilled (0703), vegetables provisionally preserved (0711), coffee (0901), tea (0902), wheat or meslin flour (1101), cereal grouts, meal and pellets (1103), oil seeds (1207), medicinal plants (1211) and vegetable products, nes (1404) showed a declining trend in RCA values over the study period. This implies that India is losing its comparative advantage in export of these products.

(3) Animal or vegetable fat products: This category consists of 16 products of which only 3 have shown a Revealed Comparative Advantage in all four indices. Table 3c appendix shows the four indices of RCA values for animal or vegetable fat products along with the average value and coefficient of variation.

Groundnut, oil and its fractions (1508), fixed vegetable fats and oils and their fractions (1515) and animal or vegetable fats and oils (1518) had comparative advantage over the study period. Overall, the average value was negative over the years. It implies that India has comparative disadvantage in export of animal or vegetable fat products.

(4) Prepared foodstuff products: The study has analysed 49 prepared foodstuff products of which 8 have Revealed Comparative Advantage in exports. These are the products in which all four indices of RCAs showed a Revealed Comparative Advantage except during the year TE2006. Table 4d appendix shows the estimated values of RCA for prepared foodstuff products along with average value and coefficient of variation.

The estimated results show a decline in RCA value for groundnut, oil cake and other solids (2305) over the years. The value of RCA^1 was 21.35 in TE2003 and declined to 6.29 in TE2013. For products like cane or beet sugar and chemically pure sucrose in solid form (1701) and extracts, essences and concentrates of coffee and tea (2101), the values of RCA declined slightly over the years. On the other hand, RCA values have increased over the years for products like molasses resulting from extraction (1701), cucumbers, gherkins and onions preserved by vinegar (2001), soya-bean oil-cake and other solids (2304), oil-cake nes (2306), tobacco unmanufactured, and tobacco refuse (2401). It implies that India's competitiveness in export of these products has been increasing in the international market. Overall, the average value for prepared foodstuff products has been volatile. The value of RCA^1 was 0.94 in TE2003 and increased to 1.72 in TE2006, but declined again to 0.70 in TE2013. It shows that India's position has been changing from comparative disadvantage in TE2003 to comparative advantage in TE2006 and again came back to comparative disadvantage in TE2013.

(B) Consistency Test of Revealed Comparative Advantage

(1) Cardinality test: The cardinality test of RCAs will show the degree of comparative advantage a product will have compared to other products. For this test, the correlation coefficient was used to examine the consistency of cardinal measure. The estimated results of the consistency test of cardinality of the four indices from TE2003 to TE2013 are presented in Table 2. The critical cut-off point to indicate consistency is > 0.70.

For live animal products, the test for consistency found that of the six possible pairings for each of the four years (TE203, TE2006, TE2009 and TE2013) only 3 out of 24 paired showed a high level of correlation (0.70), or 12.5 per cent, out of the total pairing (24). The same kind of results was found for vegetable products also. It showed that only three out of 24 paired indices, or 12.5 per cent, had a high level of correlation among the paired. For products like animal or vegetable fat, it was found there were six possible pairings for each of the four years, and seven out of the 24 paired indices, or 29.19 per cent, showed a high level of correlation. For prepared foodstuff products, it found that 9 out of 24 paired indices, or 37.5 per cent, showed a high level of correlation. The results showed that only one of the six possible parings (RCA^1 and RCA^2) was found to have a high level of correlation. The results obtained for all the four indices are not consistent as a cardinal measure of comparative advantage. Earlier studies had found similar results (Imreferto, Lionel J. Hubbard, 2002 and Andhale and Kannan, 2015).

Table 2: Cardinal Test

Live Animal Products												
	TE 2003			**TE 2006**			**TE 2009**			**TE 2013**		
	RCA^1	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**
RCA^2	0.8407			0.7512			0.1952			0.7456		
RCA^3	0.6292	0.4855		0.6404	0.3842		0.6137	0.3712		0.5184	0.6289	
RCA^4	0.3483	0.5694	0.4659	0.3347	0.5636	0.5229	0.1545	0.6736	0.5003	0.0616	0.4985	0.5670
Vegetable Products												
	RCA^1	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**
RCA^2	0.3479			0.2163			0.3948			0.6489		
RCA^3	0.6986	0.2347		0.7796	0.1951		0.748	0.229		0.7022	0.3477	
RCA^4	0.1555	0.5586	0.3500	0.2459	0.5758	0.3774	0.3567	0.5791	0.4574	0.3798	0.5834	0.5129
Animal or Vegetable Fat Products												
	RCA^1	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**
RCA^2	0.3624			0.5118			0.6918			0.547		
RCA^3	0.6195	0.3087		0.6997	0.3946		0.5957	0.6803		0.6282	0.7668	
RCA^4	0.5366	0.7568	0.5962	0.5977	0.7416	0.6446	0.5227	0.85	0.8208	0.5056	0.8803	0.9083
Prepared Foodstuff Products												
	RCA^1	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**
RCA^2	0.9841			0.9874			0.9977			0.9822		
RCA^3	0.5148	0.5219		0.4695	0.4488		0.5442	0.5352		0.7066	0.6909	
RCA^4	0.4501	0.5139	0.7883	0.1789	0.2226	0.7500	0.3761	0.3961	0.7957	0.6018	0.6759	0.7717

Source: Author's calculation based on ITC database.

Table 3: Ordinal Test

Live Animal Products												
	TE 2003			**TE 2006**			**TE 2009**			**TE 2013**		
	RCA^1	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**
RCA^2	0.8311			0.5556			0.5925			0.8085		
RCA^3	0.9911	0.8256		0.9993	0.5549		0.9932	0.5891		0.9932	0.8003	
RCA^4	0.5268	0.7880	0.5337	0.5241	0.8441	0.5214	0.5556	0.9056	0.5419	0.6315	0.7915	0.6226
Vegetable Products												
	RCA^1	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**
RCA^2	0.5696			0.6228			0.6135			0.6542		
RCA^3	0.9962	0.5783		0.9968	0.6177		0.9983	0.6164		0.9977	0.6534	
RCA^4	0.3208	0.7511	0.3322	0.374	0.7896	0.362	0.4319	0.7949	0.4355	0.4528	0.747	0.4462
Animal or Vegetable Fat Products												
	RCA^1	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**
RCA^2	0.2176			0.3500			0.5059			0.7588		
RCA^3	0.9000	0.1353		0.9824	0.3588		0.9882	0.5412		0.9853	0.7559	
RCA^4	0.5559	0.8176	0.4765	0.5735	0.8294	0.6059	0.7324	0.8265	0.7588	0.9059	0.9088	0.9176
Prepared Foodstuff Products												
	RCA^1	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**
RCA^2	0.7835			0.6194			0.7747			0.7916		
RCA^3	0.9866	0.7741		0.9974	0.6326		0.9939	0.7787		0.9933	0.7785	
RCA^4	0.8092	0.9194	0.8032	0.6983	0.8963	0.7001	0.7933	0.9173	0.8054	0.7584	0.8916	0.7597

Source: Author's calculation based on ITC database.

(2) Ordinality test: The ordinal test is based on rank correlation coefficient between each paring of four indices. Table 3 presents the results of ordinality test for four product groups, which shows that for live animal products, 12 out of 24 parings found a high correlation (> 0.70), which works out to 50 per cent. For vegetable products, it showed high correlation for only 8 paired. For animal or vegetable fat products, 14 out of 24 parings, or 58.33 per cent, showed a high level of correlation, and for prepared foodstuff products, 21 out of 24 parings, or 87.5 per cent, had a high level of correlation. These results support the ordinal interpretation of Revealed Comparative Advantage index, and shows that products may rank on the basis of comparative advantage. This result also supports the study done by Andhale and Kannan (2015).

(3) Dichotomous test: This test is based on the share of product groups in which both of the paired indices show comparative advantage or disadvantage. Table 4 presents the result of the dichotomous test, which showed that for live animal and vegetable products, 8 out of 24 parings, or 33.33 per cent, had a high level of correlation among the paired (> 70). For animal or vegetable fat products, 23 out of 24 parings, or 95.83 per cent, showed a very high correlation and for prepared foodstuff products, 10 out of 24 parings, or 41.66 per cent, showed a high correlation. Overall, only animal or vegetable fat products showed a very high correlation and consistency according to the dichotomous test measure.

Table 4: Dichotomous Test – share of (per cent) Matching Indices

Live Animal Products												
	TE 2003			***TE 2006***			***TE 2009***			***TE 2013***		
	RCA^1	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**
RCA^2	53.85			61.54			50			57.69		
RCA^3	100	53.85		100	61.54		96.15	46.15		100	57.69	
RCA^4	53.85	100	53.85	57.69	96.15	57.69	57.69	92.31	53.85	57.69	92.31	57.69
Vegetables Products												
	RCA^1	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**
RCA^2	58.62			65.52			62.07			60.34		
RCA^3	98.28	56.9		100	65.52		100	62.07		100	60.34	
RCA^4	62.07	96.55	60.34	63.79	94.83	63.793	62.07	100	62.07	62.07	98.28	62.07
Animal or Vegetable Fat Products												
	RCA^1	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**
RCA^2	81.25			87.5			87.5			75		
RCA^3	93.75	75		100	87.5		87.5	75		100	75	
RCA^4	81.25	100	75	87.5	100	87.5	81.25	93.75	68.75	75	100	75
Prepared Foodstuff Products												
	RCA^1	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**	**RCA^1**	**RCA^2**	**RCA^3**
RCA^2	59.18			63.27			67.35			63.27		
RCA^3	100	59.18		97.96	65.31		100	67.35		97.96	61.22	
RCA^4	61.22	93.88	61.22	63.27	95.92	65.31	71.43	95.92	71.43	65.31	97.96	63.27

Source: Author's calculation based on ITC database.

(C) Stability of Revealed Comparative Advantage

To check the stability of RCA indices we applied two indicators. One is the coefficient of variation (CV) while the second is the correlation between the index in a time period and the index in subsequent time periods.

The coefficient of variation is presented in Table 2a to 4a appendix at the bottom. The results showed that for vegetable and animal or vegetable fat products the RCA indices were fairly stable over the study years. For RCA indices of live animal products, the CV has increased. In contrast, for prepared foodstuff products it has declined over the years.

The second indicator of stability in RCA used in the study is the correlation coefficient between the index time period and the index in subsequent time periods. The results are presented in Table 5. Using TE2003 as base year, the correlation coefficient for four indices for the agriculture sector during TE2003 to TE2013 is quite high; for 45 out of 48 (12 indices X 4 years), the coefficients are greater than cut-off point (0 .70). It is clear that the paired indices of RCA show a high degree of stability during the study period.

Table 5: Stability Test

Live Animal Products							
	RCA^1_{TE2003}		**RCA^2_{TE2003}**		**RCA^3_{TE2003}**		**RCA^4_{TE2003}**
RCA^1_{TE2006}	0.9764	**RCA^1_{TE2006}**	0.9396	**RCA^1_{TE2006}**	0.9449	**RCA^1_{TE2006}**	0.8212
RCA^1_{TE2009}	0.6499	**RCA^1_{TE2009}**	0.8125	**RCA^1_{TE2009}**	0.9201	**RCA^1_{TE2009}**	0.7713
$RCA^1_{TE20013}$	0.2771	**$RCA^1_{TE20013}$**	0.7576	**$RCA^1_{TE20013}$**	0.8958	**$RCA^1_{TE20013}$**	0.735
Vegetable Products							
	RCA^1_{TE2003}		**RCA^2_{TE2003}**		**RCA^3_{TE2003}**		**RCA^4_{TE2003}**
RCA^1_{TE2006}	0.9372	**RCA^1_{TE2006}**	0.9058	**RCA^1_{TE2006}**	0.9634	**RCA^1_{TE2006}**	0.9019
RCA^1_{TE2009}	0.7728	**RCA^1_{TE2009}**	0.9006	**RCA^1_{TE2009}**	0.9362	**RCA^1_{TE2009}**	0.8322
$RCA^1_{TE20013}$	0.6819	**$RCA^1_{TE20013}$**	0.7945	**$RCA^1_{TE20013}$**	0.9188	**$RCA^1_{TE20013}$**	0.7820
Animal or Vegetable Fat Products							
	RCA^1_{TE2003}		**RCA^2_{TE2003}**		**RCA^3_{TE2003}**		**RCA^4_{TE2003}**
RCA^1_{TE2006}	0.9315	**RCA^1_{TE2006}**	0.8804	**RCA^1_{TE2006}**	0.9129	**RCA^1_{TE2006}**	0.8968
RCA^1_{TE2009}	0.9926	**RCA^1_{TE2009}**	0.8163	**RCA^1_{TE2009}**	0.8804	**RCA^1_{TE2009}**	0.8883
$RCA^1_{TE20013}$	0.9907	**$RCA^1_{TE20013}$**	0.8504	**$RCA^1_{TE20013}$**	0.8156	**$RCA^1_{TE20013}$**	0.8264
Prepared Foodstuff Products							
	RCA^1_{TE2003}		**RCA^2_{TE2003}**		**RCA^3_{TE2003}**		**RCA^4_{TE2003}**
RCA^1_{TE2006}	0.9873	**RCA^1_{TE2006}**	0.9562	**RCA^1_{TE2006}**	0.9303	**RCA^1_{TE2006}**	0.8304
RCA^1_{TE2009}	0.9934	**RCA^1_{TE2009}**	0.9752	**RCA^1_{TE2009}**	0.8944	**RCA^1_{TE2009}**	0.8325
$RCA^1_{TE20013}$	0.8266	**$RCA^1_{TE20013}$**	0.8055	**$RCA^1_{TE20013}$**	0.8922	**$RCA^1_{TE20013}$**	0.7747

Source: Author's calculation based on ITC database.

Summary and Conclusion

The paper has estimated the Revealed Comparative Advantage index for India's agriculture sector with respect to the world at the four-digit level (HS 2007) for the period 2001 to 2013. The study has used four alternative indices of RCA. It was found that India has comparative advantage in export of 7 out of 26 live animal products, and 18 out of 58 vegetable products. In animal or vegetable fat and prepared foodstuff products, it enjoys this advantage in 3 out of 16 and 8 out of 49 products respectively. It is interesting to observe that India was losing its comparative advantage in world markets for vegetable products, animal or vegetable fat products and prepared foodstuff products during the study period. The main reason for the declining trend in comparative advantage index is that the denominator is increasing more than the numerator. It implies that the export of certain products, rather than total agricultural trade, has been declining. Multiple factors are contributing to the declining export of agricultural products, and these include poor quality in terms of international norms, and lack of infrastructure in labelling, packaging, marketing, storage facility etc.

The study has conducted three alternative consistency tests for the four RCA indices of Revealed Comparative Advantage. The results showed that the four indices are less consistent as cardinal measures but relatively consistent as ordinal measures. The dichotomous test is relatively more consistent on all four indices than cardinal measures but it is relatively less consistent than ordinal measures. Therefore, the RCA measure is also a useful indicator in determining whether a product has more comparative advantage or disadvantage than another product. Overall, the ordinal measures are relatively more consistent than the other two consistency tests, at around 57.29 per cent, with the indices at greater than cut-off point (>0.70). This shows that it is fairly stable over the years.

Finally, the study has used the CV and correlation coefficient between the index time period and the index in subsequent time periods to find out the stability of RCA indices. The results showed that the RCA indices are fairly stable for vegetable and animal or vegetable fat products. For live animal and prepared foodstuff products, it found that the value of RCA indices was unstable over the study period. Based on the study, it is suggested that India should prepare policy initiatives for promoting at the global level the products with comparative advantage in exports. The study also suggests that improving infrastructure facilities in labelling and packaging, raising the quality of exportable products, providing greater storage facilities and marketing agricultural products better in the world market will provide an advantage for the Indian agricultural sector.

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Appendix

Table 1a: RCA indices of Live Animal Products

Live Animal Products																
	TE2003				TE2006				TE2009				TE2013			
Code	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0
0106	0.05	0.04	-4.04	1.77	0.00	-0.08	-6.18	-3.37	0.02	-0.16	-4.86	-3.09	0.01	-0.29	-4.97	-3.77
0203	0.00	0.00	-7.71	0.94	0.00	0.00	-6.52	0.50	0.00	0.00	-6.31	-0.26	0.00	0.00	-8.33	-2.65
0204	0.36	0.36	-1.07	5.93	0.32	0.32	-1.16	4.94	1.26	1.26	-0.06	5.72	0.48	0.48	-0.77	4.99
0207	0.01	0.01	-6.05	2.09	0.01	0.01	-4.94	3.17	0.01	0.01	-5.09	3.31	0.02	0.02	-4.28	4.20
0210	0.03	0.03	-3.46	3.93	0.04	0.04	-3.29	3.39	0.05	0.04	-3.14	2.48	0.02	0.02	-4.57	3.44
0302	0.17	0.05	-1.81	0.43	0.19	0.02	-1.66	0.15	0.18	-0.14	-1.75	-0.44	0.17	-0.1	-1.77	0.05
0303	**1.87**	**1.87**	**0.62**	**6.52**	**1.16**	**1.15**	**0.10**	**5.00**	**1.25**	**1.23**	**0.20**	**4.75**	**1.27**	**1.26**	**0.23**	**4.79**
0304	0.15	0.15	-1.88	5.37	0.16	0.13	-1.87	2.08	0.26	0.26	-1.35	3.52	0.33	0.29	-1.11	2.00
0305	0.23	0.22	-1.51	3.44	0.21	0.18	-1.57	2.07	0.19	0.15	-1.71	1.74	0.18	0.16	-1.75	2.15
0306	**5.47**	**5.44**	**1.70**	**5.13**	**4.85**	**4.8**	**1.58**	**4.61**	**3.55**	**3.50**	**1.26**	**4.21**	**3.97**	**3.94**	**1.37**	**4.87**
0307	**1.88**	**1.84**	**0.62**	**4.07**	**2.20**	**2.16**	**0.78**	**4.13**	**2.05**	**2.00**	**0.72**	**3.57**	**2.14**	**2.10**	**0.76**	**4.01**
0402	0.21	0.11	-1.57	1.49	0.58	0.55	-0.64	3.03	0.45	0.41	-0.84	2.44	0.32	0.04	-1.86	0.25
0403	0.01	0.00	-5.21	0.15	0.01	0.00	-4.62	0.26	0.08	0.06	-3.53	0.56	0.01	0.01	-4.64	0.51
0404	0.04	-0.11	-3.18	-1.24	0.07	-0.10	-2.70	-0.90	0.10	-0.08	-2.59	-0.83	0.01	-0.32	-5.2	-4.05
0405	0.13	-0.2	-2.02	-0.74	0.22	-0.04	-1.54	0.08	0.42	0.06	-0.91	0.99	0.22	0.11	-1.51	1.30
0406	0.00	-0.02	-5.71	-1.85	0.01	-0.02	-5.19	-1.38	0.02	0.00	-3.89	-0.23	0.02	-0.01	-4.16	-0.41
0407	**1.11**	**1.06**	**0.07**	**3.60**	**1.77**	**1.71**	**0.52**	**3.37**	**1.37**	**1.34**	**0.27**	**4.06**	**0.44**	**0.41**	**-0.88**	**2.91**
0409	0.81	0.32	-0.39	0.38	1.74	1.51	0.54	2.38	1.17	0.84	0.06	1.18	1.57	1.49	0.43	2.95
0501	2.73	2.59	0.43	3.22	4.75	-2.64	1.46	-0.26	14.22	-3.80	2.01	-0.86	28.62	6.26	3.34	0.33
0502	0.16	-9.02	-1.94	-4.15	0.35	-7.81	-1.12	-3.22	0.09	-3.07	-2.5	-3.65	0.13	-3.1	-2.05	-3.22
0505	0.03	-0.01	-3.6	-0.34	0.00	-0.01	-5.47	-1.36	0.00	-0.01	-6.08	-0.9	0.00	-0.01	-6.25	-1.51
0506	**12.8**	**12.29**	**2.55**	**3.29**	**12.51**	**12.6**	**2.53**	**3.45**	**8.83**	**8.73**	**2.17**	**4.56**	**3.94**	**3.76**	**1.36**	**3.63**
0507	**3.64**	**3.58**	**1.28**	**4.28**	**2.83**	**2.62**	**1.03**	**2.98**	**4.08**	**3.99**	**1.4**	**4.54**	**2.95**	**2.9**	**0.97**	**4.01**
0508	0.54	-1.94	-0.63	-1.46	0.59	-1.33	-0.54	-1.19	1.05	-2.29	0.05	-1.15	0.62	-1.43	-0.48	-1.19
0510	**2.89**	**2.87**	**1.02**	**5.33**	**2.04**	**1.98**	**0.61**	**3.47**	**0.78**	**0.06**	**-0.36**	**0.57**	**0.64**	**0.24**	**-0.46**	**0.77**
0511	0.88	0.25	-0.24	0.25	0.19	-0.09	-1.83	-0.52	0.25	0.08	-1.48	0.33	0.12	-0.15	-2.22	-0.91
Avg,	**139**	**0.84**	**-1.68**	**1.99**	**1.42**	**0.66**	**-1.6**	**1.42**	**1.6**	**0.56**	**-1.47**	**1.43**	**1.85**	**0.69**	**-1.88**	**1.13**
C.V.	**1.94**	**4.02**	**-1.54**	**1.38**	**1.88**	**4.8**	**-1.61**	**1.74**	**1.99**	**4.19**	**-1.63**	**1.77**	**3.01**	**2.66**	**-1.46**	**2.46**

Source: Author's calculation based on ITC database. Note. Avg- Average, C.V.- Coefficient of variation.

Table 2b: RCA indices of Vegetable Products

Vegetable Products																
	TE2003				TE2006				TE2009				TE2013			
Code	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0
0601	0.06	-0.04	-2.76	-0.49	0.07	-0.05	-2.64	-0.50	0.06	-0.22	-2.75	-1.47	0.03	-0.21	-3.66	-2.21
0602	0.06	0.03	-2.85	0.90	0.08	0.01	-2.49	0.26	0.14	0.03	-2.02	0.28	0.06	-0.02	-2.84	-0.34
0603	0.36	0.35	-1.02	3.92	0.41	0.40	-0.88	3.80	0.38	0.36	-1.18	2.85	0.16	0.13	-1.82	1.80
0604	**1.22**	**1.18**	**0.07**	**3.54**	**2.10**	**2.07**	**0.74**	**4.35**	**1.81**	**1.74**	**0.59**	**3.27**	**0.88**	**0.82**	**-0.18**	**2.75**
0703	**3.38**	**2.49**	**1.20**	**1.39**	**4.79**	**4.57**	**1.56**	**3.72**	**5.87**	**5.84**	**1.74**	**5.97**	**2.99**	**2.93**	**1.08**	**5.12**
0704	0.00	-0.02	-5.97	-2.13	0.01	-0.01	-4.51	-0.54	0.01	-0.01	-4.37	-0.58	0.03	0.02	-3.53	1.16
0706	0.02	0.01	-4.18	1.86	0.03	0.03	-3.45	2.44	0.03	0.03	-3.46	2.78	0.04	0.03	-3.53	3.26
0709	0.45	0.45	-0.82	5.59	0.28	0.28	-1.29	4.53	0.44	0.43	-0.84	4.37	0.35	0.34	-1.07	4.05
0710	0.31	0.3	-1.17	3.47	0.27	0.26	-1.32	3.27	0.2	0.19	-1.59	2.93	0.23	0.22	-1.5	3.88
0711	**4.03**	**4.00**	**1.39**	**4.84**	**6.53**	**6.43**	**1.86**	**4.28**	**6.29**	**6.19**	**1.81**	**4.07**	**3.02**	**2.76**	**1.10**	**2.48**
0712	**1.32**	**1.21**	**0.27**	**2.50**	**1.45**	**1.30**	**0.33**	**2.30**	**1.57**	**1.37**	**0.38**	**2.01**	**1.25**	**1.05**	**0.22**	**1.84**
0713	2.01	-29.7	0.70	-2.75	3.57	-21.52	1.24	-1.97	1.14	-30.21	0.05	-3.39	1.13	-18.2	0.09	-2.87
0801	22.56	-0.76	3.11	-0.01	18.26	-10.5	2.90	-0.45	12.6	-8.92	2.53	-0.51	6.41	-9.47	1.85	-0.91
0802	0.54	-3.3	-0.61	-1.95	0.34	-4.14	-1.08	-2.58	0.31	-4.44	-1.18	-2.72	0.17	-3.77	-1.78	-3.15
0804	1.30	-1.4	0.11	-0.81	2.70	0.14	0.99	0.07	2.63	0.08	0.96	0.03	1.13	-0.90	0.10	-0.57
0805	0.13	0.12	-2.10	3.03	0.14	0.13	-1.95	2.26	0.10	0.05	-2.31	0.67	0.07	-0.06	-2.64	-0.61
0806	0.40	0.06	-0.94	0.18	0.55	0.16	-0.63	0.33	0.79	0.47	-0.25	0.9	0.71	0.47	-0.38	1.12
0807	0.07	0.06	-2.66	1.55	0.09	0.07	-2.4	1.70	0.14	0.13	-1.98	2.38	0.15	0.15	-1.91	4.10
0808	0.05	-0.41	-3.54	-2.74	0.10	-0.4	-2.32	-1.58	0.07	-1.08	-2.66	-2.80	0.05	-1.71	-2.96	-3.52
0809	0.01	0.00	-5.73	-0.69	0.00	-0.02	-5.45	-1.73	0.01	-0.03	-5.27	-1.92	0.00	-0.04	-6.48	-3.34
0810	0.32	0.29	-1.15	2.31	0.26	0.21	-1.37	1.67	0.33	0.23	-1.11	1.18	0.24	0.14	-1.43	0.83
0811	0.02	0.01	-3.84	1.62	0.06	0.05	-2.76	1.78	0.14	0.13	-2.04	3.07	0.28	0.26	-1.29	2.85
0813	0.26	-0.3	-1.34	-0.73	0.35	-0.34	-1.05	-0.67	0.35	-0.37	-1.06	-0.65	0.41	-0.06	-1.01	-0.16
0901	**1.72**	**1.66**	**0.54**	**3.44**	**1.40**	**1.12**	**0.33**	**1.73**	**1.03**	**0.70**	**0.02**	**1.18**	**0.77**	**0.46**	**-0.27**	**0.93**

Vegetable Products																
	TE2003				TE2006				TE2009				TE2013			
Code	RCA[1] >1	RCA[2] >0	RCA[3] >0	RCA[4] >0	RCA[1] >1	RCA[2] >0	RCA[3] >0	RCA[4] >0	RCA[1] >1	RCA[2] >0	RCA[3] >0	RCA[4] >0	RCA[1] >1	RCA[2] >0	RCA[3] >0	RCA[4] >0
0902	**9.34**	**8.35**	**2.23**	**2.32**	**7.78**	**6.51**	**2.05**	**1.82**	**6.53**	**5.45**	**1.87**	**1.81**	**4.42**	**3.84**	**1.47**	**2.00**
0904	**7.39**	**4.07**	**2.00**	**0.84**	**8.86**	**5.40**	**2.18**	**0.94**	**11.71**	**8.69**	**2.45**	**1.36**	**7.39**	**4.92**	**1.97**	**1.07**
0905	0.31	0.30	-1.48	4.58	1.81	1.78	0.52	4.56	3.59	3.42	1.25	3.04	1.38	0.89	0.26	1.01
0906	0.42	-10.40	-0.99	-3.31	0.29	-9.27	-1.27	-3.52	0.6	-8.59	-0.51	-2.72	0.28	-6.62	-1.29	-3.19
0907	0.20	-28.5	-1.78	-5.09	0.22	-45.82	-1.54	-5.35	0.36	-38.02	-1.24	-4.85	0.64	-14.22	-0.6	-3.26
0908	5.11	-3.62	1.63	-0.54	4.37	-5.04	1.47	-0.75	4.17	-4.30	1.40	-0.67	5.90	1.98	1.76	0.44
0909	**10.27**	**4.85**	**2.3**	**0.65**	**13.07**	**5.81**	**2.57**	**0.62**	**19.48**	**13.92**	**2.93**	**1.22**	**15.83**	**12.58**	**2.76**	**1.59**
0910	**8.86**	**7.59**	**2.18**	**1.96**	**7.08**	**4.77**	**1.96**	**1.13**	**7.64**	**5.28**	**2.03**	**1.19**	**7.08**	**5.74**	**1.94**	**1.65**
1004	0.03	0.02	-5.91	-0.42	0.02	-0.35	-4.24	-3.07	0.01	-0.45	-5.52	-4.72	0.01	-0.26	-5.43	-4.04
1005	0.16	0.15	-1.90	3.64	0.75	0.75	-0.38	4.79	1.64	1.62	0.45	4.35	1.32	1.3	0.27	4.72
1006	**9.89**	**9.88**	**2.26**	**7.46**	**10.6**	**10.6**	**2.36**	**10.47**	**9.55**	**9.55**	**2.24**	**9.69**	**9.74**	**9.74**	**2.26**	**7.91**
1008	0.98	0.95	-0.02	3.68	3.83	3.72	1.32	3.58	3.99	3.83	1.32	3.19	1.77	1.71	0.54	4.23
1101	**2.47**	**2.43**	**0.88**	**4.1**	**0.9**	**0.79**	**-0.43**	**1.82**	**0.17**	**0.14**	**-1.94**	**1.58**	**0.61**	**0.58**	**-0.63**	**3.13**
1102	0.41	-0.72	-1.03	-0.24	1.09	1.04	0.08	3.24	1.55	1.49	0.44	3.26	0.69	0.65	-0.40	2.80
1103	**1.15**	**1.11**	**-0.43**	**3.48**	**0.41**	**0.31**	**-1.01**	**1.37**	**0.44**	**0.36**	**-0.84**	**1.76**	**0.62**	**0.51**	**-0.49**	**1.75**
1104	0.03	0.01	-3.45	0.3	0.04	-0.09	-3.31	-1.03	0.05	-0.49	-2.95	-2.28	0.12	-0.95	-2.20	-2.27
1105	0.04	-0.18	-3.25	-1.7	0.15	-0.15	-2.15	-0.69	0.2	0.11	-1.7	0.7	0.34	0.26	-1.08	1.38
1106	**1.74**	**1.48**	**0.53**	**1.97**	**1.87**	**1.74**	**0.6**	**2.88**	**2.84**	**2.48**	**1.04**	**2.06**	**3.19**	**2.84**	**1.15**	**2.20**
1107	0.01	0.00	-4.99	0.34	0.01	-0.01	-4.67	0.36	0.02	-0.10	-3.94	-1.61	0.04	-0.05	-3.43	-0.90
1108	0.22	0.06	-1.50	0.41	0.33	0.13	-1.17	0.53	0.37	0.09	-1.03	0.32	0.64	0.41	-0.46	1.06
1109	0.03	-0.66	-4.58	-4.19	0.06	-1.09	-2.85	-2.98	0.06	-0.62	-3.47	-2.88	0.01	-0.33	-4.80	-3.67
1201	0.03	0.03	-4.40	4.14	0.10	0.10	-3.64	3.24	0.02	0.02	-4.34	4.28	0.03	0.03	-3.55	4.06
1202	**5.48**	**5.48**	**1.66**	**4.9**	**9.72**	**9.72**	**2.26**	**2.89**	**11.49**	**11.48**	**2.44**	**8.97**	**12.32**	**12.32**	**2.45**	**8.08**
1207	**9.62**	**8.77**	**2.25**	**2.48**	**9.04**	**7.45**	**2.2**	**1.76**	**9.75**	**6.89**	**2.27**	**1.22**	**6.3**	**4.21**	**1.81**	**1.19**
1208	1.26	0.76	0.23	2.03	0.44	0.00	-0.90	-0.02	0.7	0.67	-0.36	4.39	0.85	0.83	-0.65	3.78

Vegetable Products																
	TE2003				TE2006				TE2009				TE2013			
Code	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0
1209	0.46	-0.62	-0.8	-0.88	0.37	-0.74	-1.00	-1.10	0.42	-1.02	-0.89	-1.24	0.38	-0.63	-0.97	-0.98
1211	**5.03**	**3.89**	**1.61**	**1.49**	**4.05**	**2.05**	**1.4**	**0.72**	**4.25**	**2.13**	**1.45**	**0.71**	**2.68**	**1.2**	**0.98**	**0.58**
1212	0.07	-0.10	-2.92	-1.09	0.17	-0.15	-1.81	-0.54	0.15	0.03	-1.90	0.25	0.16	-0.10	-1.81	-0.42
1213	0.05	-0.31	-3.37	-2.27	0.03	-0.6	-3.61	-3.11	0.04	-0.71	-3.80	-3.41	0.01	-0.09	-4.95	-2.52
1214	0.02	0.02	-5.17	2.43	0.01	0.01	-4.96	2.39	0.00	0.00	-5.66	0.44	0.00	0.00	-6.52	-1.09
1301	**19.35**	**9.18**	**2.96**	**0.64**	**11.71**	**0.14**	**2.36**	**-0.07**	**5.25**	**-7.42**	**1.65**	**-0.87**	**7.46**	**-1.37**	**1.99**	**-0.17**
1302	**5.46**	**4.68**	**1.69**	**1.94**	**7.29**	**6.54**	**1.97**	**2.26**	**6.31**	**5.51**	**1.84**	**2.06**	**17.01**	**16.41**	**2.82**	**3.34**
1401	0.11	-0.3	-2.28	-1.36	0.12	-0.72	-2.32	-2.03	0.19	-0.71	-1.8	-1.67	0.14	-2.44	-2.03	-2.91
1404	**3.72**	**3.54**	**1.31**	**3.11**	**5.58**	**5.19**	**1.72**	**2.67**	**4.38**	**3.7**	**1.47**	**1.99**	**3.78**	**3.33**	**1.33**	**2.16**
Avg.	**2.59**	**0.15**	**-10.00**	**1.13**	**2.69**	**-0.16**	**-0.69**	**1.00**	**2.66**	**-0.05**	**-0.68**	**0.98**	**2.31**	**0.6**	**-0.85**	**0.92**
C.V.	**1.76**	**44.1**	**-2.46**	**2.27**	**1.51**	**-48.1**	**-3.23**	**2.63**	**1.53**	**-155**	**-3.34**	**2.97**	**1.67**	**8.57**	**-2.69**	**3.06**

Source: Author's calculation based on ITC database.

Note: Avg- Average, C. V.- Coefficient of Variation.

Table 3c: RCA indices of Animal or Vegetable fat Products

Animal or Vegetable fat Products																
	TE2003				TE2006				TE2009				TE2013			
Code	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0
1504	0.20	-0.39	-1.59	-1.02	0.15	-0.19	-1.91	-0.83	0.38	0.20	-0.99	0.77	0.66	0.53	-0.43	1.68
1505	0.29	-0.92	-1.37	-1.57	0.50	-1.02	-0.72	-1.14	0.51	-0.66	-0.68	-0.82	0.5	-0.22	-0.70	-0.36
1507	0.07	-21.27	-2.83	-5.87	0.12	-20.01	-2.17	-5.15	0.04	-7.73	-3.37	-5.35	0.02	-9.34	-4.75	-6.98
1508	**1.93**	**1.93**	**-2.41**	**3.68**	**5.41**	**5.41**	**0.89**	**5.59**	**3.5**	**3.49**	**-0.03**	**5.54**	**2.05**	**2.00**	**0.44**	**3.42**
1509	0.00	-0.16	-6.96	-5.12	0.00	-0.13	-7.13	-5.12	0.00	-0.22	-7.59	-6.06	0.01	-0.4	-5.66	-4.76
1510	0.06	0.05	-3.23	1.48	0.12	0.11	-3.33	2.74	0.12	0.02	-2.73	0.56	0.01	-0.54	-5.28	-4.45
1511	0.07	-28.21	-4.91	-8.25	0.01	-18.67	-5.05	-7.96	0.00	-13.15	-8.06	-10.64	0.00	-15.6	-7.89	-10.63
1512	0.03	-5.09	-4.11	-4.71	0.06	-2.13	-3.47	-4.03	0.05	-4.09	-3.45	-4.68	0.01	-9.64	-4.50	-6.77
1513	0.36	-3.32	-1.10	-2.39	0.20	-4.02	-1.62	-3.05	0.16	-4.36	-1.82	-3.32	0.11	-3.03	-2.20	-3.30
1514	0.08	-0.86	-2.61	-1.17	0.06	0.06	-2.90	3.35	0.04	-0.24	-3.42	0.95	0.02	-0.65	-3.98	-3.28
1515	**7.28**	**6.94**	**1.97**	**3.1**	**7.91**	**7.56**	**2.07**	**3.12**	**9.57**	**9.14**	**2.23**	**3.12**	**8.00**	**7.56**	**2.07**	**2.90**
1516	0.75	-3.45	-0.3	-1.65	0.82	-7.23	-0.25	-2.17	0.56	-2.75	-0.60	-1.02	0.5	0.23	-0.7	0.61
1517	0.20	0.13	-1.68	1.20	0.10	-0.50	-2.36	-1.43	0.02	-0.31	-3.71	-1.9	0.03	0.01	-3.71	0.33
1518	**1.11**	**-12.9**	**0.02**	**-2.19**	**1.43**	**0.94**	**0.361**	**1.13**	**1.26**	**1.19**	**-0.09**	**2.62**	**0.34**	**0.12**	**-1.25**	**0.40**
1520	0.05	-2.13	-3.46	-4.24	0.03	-3.12	-3.67	-4.82	0.13	-4.48	-2.23	-3.66	0.04	-0.93	-3.32	-3.28
1521	0.23	-1.22	-1.52	-1.89	0.15	-0.81	-2.04	-1.99	0.20	-1.12	-1.64	-1.91	0.19	-1.04	-1.71	-1.92
Avg.	**0.80**	**-4.43**	**-2.26**	**-1.91**	**1.07**	**-2.73**	**-2.08**	**-1.36**	**1.03**	**-1.57**	**-2.39**	**-1.61**	**0.78**	**-1.93**	**-2.72**	**-2.27**
C. V.	**2.27**	**-2.03**	**-0.93**	**-1.70**	**2.12**	**-2.67**	**-1.10**	**-2.74**	**2.36**	**-3.11**	**-1.11**	**-2.49**	**2.55**	**-2.79**	**-0.96**	**-1.71**

Source: Author's calculation based on ITC database.

Note: Avg- Average, C. V.- Coefficient of Variation.

Table 4d: RCA indices of Prepared Foodstuff Products

Prepared Foodstuff Products																
	TE2003				TE2006				TE2009				TE2013			
Code	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0	RCA^1 >1	RCA^2 >0	RCA^3 >0	RCA^4 >0
1601	0.00	0.00	-5.96	-1.25	0.00	-0.02	-5.51	-1.52	0.01	-0.05	-5.35	-2.36	0.01	-0.02	-5.08	-1.51
1602	0.01	0.00	-4.77	0.29	0.01	0.01	-4.48	1.19	0.00	0.00	-5.32	-0.51	0.00	-0.01	-6.10	-1.33
1603	0.77	0.64	-0.80	1.27	0.42	0.23	-1.18	0.74	1.67	1.47	0.15	1.79	2.34	2.17	-0.93	0.91
1604	0.05	0.05	-3.74	2.7	0.25	0.25	-1.41	4.82	0.26	0.25	-1.37	4.71	0.12	0.12	-2.24	3.96
1605	0.43	0.43	-1.34	7.11	1.42	1.41	0.35	4.7	1.36	1.34	0.3	4.75	0.25	0.24	-1.42	3.91
1701	**2.59**	**2.48**	**0.94**	**3.25**	**0.98**	**-0.42**	**-0.57**	**0.5**	**2.85**	**1.42**	**0.21**	**2.04**	**1.91**	**1.21**	**0.59**	**1.34**
1702	0.36	-0.26	-1.02	-0.55	0.36	-0.22	-1.03	-0.47	0.41	-0.34	-0.92	-0.62	0.49	-0.23	-0.71	-0.38
1703	**1.60**	**1.13**	**0.42**	**1.22**	**1.07**	**-4.35**	**-0.45**	**-1.46**	**3.12**	**2.65**	**0.60**	**1.51**	**1.86**	**1.81**	**0.57**	**3.62**
1704	0.14	0.05	-2.00	0.43	0.22	0.10	-1.52	0.59	0.27	0.09	-1.31	0.44	0.26	0.11	-1.35	0.59
1801	0.00	-0.14	-7.57	-5.49	0.00	-0.29	-9.60	-8.32	0.01	-0.34	-3.43	-2.74	0.00	-0.53	-5.94	-5.29
1804	0.02	-0.16	-6.67	-4.90	0.05	0.03	-3.05	1.39	0.05	-0.03	-3.14	-0.54	0.15	-0.02	-1.90	-0.08
1805	0.00	-0.39	-5.79	-4.83	0.01	-0.50	-5.23	-4.55	0.01	-0.68	-5.70	-5.31	0.00	-0.68	-5.53	-5.14
1806	0.02	-0.08	-3.72	-1.43	0.03	-0.09	-3.59	-1.45	0.04	-0.13	-3.25	-1.48	0.06	-0.19	-2.83	-1.44
1901	0.39	0.33	-0.97	1.80	0.23	0.12	-1.49	0.76	0.30	0.26	-1.21	1.95	0.26	0.21	-1.37	1.71
1902	0.05	-0.19	-3.01	-1.57	0.06	-0.10	-2.83	-0.99	0.08	-0.12	-2.50	-0.83	0.08	0.00	-2.48	0.00
1904	0.30	-0.42	-1.24	-0.9	0.43	-0.18	-0.83	-0.34	0.32	0.17	-1.15	0.93	0.25	0.21	-1.41	2.02
1905	0.13	0.09	-2.13	0.94	0.29	0.24	-1.24	1.79	0.36	0.29	-1.03	1.68	0.37	0.31	-1.01	1.86
2001	**3.03**	**2.91**	**1.10**	**3.6**	**4.22**	**4.18**	**1.42**	**4.73**	**5.00**	**4.96**	**1.60**	**4.97**	**3.38**	**3.34**	**1.22**	**4.35**
2002	0.01	-0.04	-4.84	-0.87	0.01	-0.15	-5.14	-3.25	0.01	-0.19	-5.21	-3.43	0.01	-0.15	-4.80	-2.96
2003	0.80	0.79	-0.26	4.99	1.65	1.64	0.48	5.20	0.58	0.55	-0.74	3.06	0.53	0.50	-0.87	2.88
2004	0.10	0.00	-2.36	-0.03	0.11	-0.08	-2.24	-0.56	0.11	-0.05	-2.25	-0.42	0.11	0.00	-2.17	0.04
2005	0.02	-0.01	-4.07	-0.47	0.09	0.06	-2.57	0.75	0.17	0.13	-1.78	1.42	0.12	0.09	-2.14	1.32
2006	0.17	0.14	-1.82	2.49	0.18	0.16	-1.86	2.67	0.06	0.01	-3.05	0.22	0.11	-0.12	-2.32	-0.79
2007	0.63	0.48	-0.47	1.44	0.87	0.70	-0.20	1.58	1.46	1.35	0.36	2.64	1.24	1.12	0.21	2.39
2008	0.21	0.19	-1.77	2.34	0.17	0.12	-1.85	1.18	0.16	0.07	-1.84	0.62	0.22	0.13	-1.54	0.96
2009	0.05	-0.14	-2.91	-1.27	0.06	-0.10	-2.82	-0.98	0.04	-0.13	-3.32	-1.51	0.03	-0.15	-3.55	-1.85

Prepared Foodstuff Products																
	TE2003				TE2006				TE2009				TE2013			
Code	RCA[1] >1	RCA[2] >0	RCA[3] >0	RCA[4] >0	RCA[1] >1	RCA[2] >0	RCA[3] >0	RCA[4] >0	RCA[1] >1	RCA[2] >0	RCA[3] >0	RCA[4] >0	RCA[1] >1	RCA[2] >0	RCA[3] >0	RCA[4] >0
2101	**2.81**	**2.68**	**1.02**	**3.35**	**2.34**	**2.27**	**0.85**	**3.61**	**2.02**	**1.95**	**0.7**	**3.36**	**1.52**	**1.46**	**0.42**	**3.31**
2102	0.14	-0.05	-2.75	-1.01	0.22	0.00	-1.53	-0.02	0.13	-0.09	-2.03	-0.50	0.05	-0.28	-2.93	-1.82
2103	0.04	0.01	-3.22	0.16	0.07	-0.03	-2.73	-0.31	0.10	-0.07	-2.3	-0.52	0.10	0.00	-2.30	-0.03
2104	0.01	-3.42	-4.58	-4.26	0.03	-0.07	-3.7	-1.3	0.07	0.03	-2.7	0.51	0.08	0.06	-2.60	1.11
2105	0.01	-0.02	-5.16	-1.29	0.01	0.01	-4.31	0.69	0.01	0.00	-4.46	-0.35	0.01	-0.03	-4.34	-1.11
2106	0.29	0.14	-1.24	0.70	0.17	0.06	-1.75	0.4	0.20	0.03	-1.64	0.16	0.19	-0.04	-1.64	-0.17
2201	0.02	-0.04	-4.50	-1.49	0.02	-0.12	-3.84	-1.78	0.01	-0.04	-4.66	-1.62	0.01	-0.01	-5.32	-1.25
2202	0.02	-0.09	-4.30	-1.69	0.03	-0.35	-3.56	-2.57	0.02	-0.36	-3.89	-2.90	0.02	-0.34	-3.85	-2.81
2203	0.06	0.02	-2.79	0.4	0.06	0.03	-2.84	0.74	0.06	0.03	-2.86	0.75	0.09	0.06	-2.37	1.19
2204	0.00	-0.01	-6.05	-1.82	0.00	-0.05	-5.81	-2.79	0.01	-0.06	-4.84	-2.01	0.01	-0.05	-5.00	-2.20
2207	0.43	0.08	-1.09	0.4	0.26	-6.2	-1.54	-2.89	0.17	-1.50	-1.90	-2.06	0.64	0.28	-0.47	0.58
2208	0.09	-0.01	-2.47	-0.09	0.11	-0.18	-2.24	-0.95	0.21	-0.25	-1.6	-0.78	0.22	-0.38	-1.54	-1.01
2209	0.03	-1.82	-3.49	-4.09	0.04	-1.49	-3.20	-3.63	0.14	-0.97	-2.08	-2.17	0.03	-0.36	-3.69	-2.73
2301	0.01	-1.25	-4.29	-4.43	0.01	-1.46	-4.56	-4.9	0.09	-0.19	-2.92	-1.44	0.23	0.09	-1.78	0.26
2302	0.82	0.58	-0.69	0.84	1.54	0.86	0.38	0.84	1.78	0.56	0.54	0.38	0.18	-0.81	-1.99	-1.96
2303	0.01	0.00	-4.74	0.84	0.03	0.03	-3.78	2.43	0.09	0.09	-2.42	3.35	0.07	0.07	-2.77	5.04
2304	**3.34**	**3.32**	**1.21**	**7.58**	**5.35**	**5.34**	**1.66**	**7.36**	**5.63**	**5.63**	**1.71**	**8.65**	**3.36**	**3.36**	**1.2**	**8.59**
2305	**21.4**	**21.29**	**2.97**	**6.43**	**51.89**	**51.83**	**3.95**	**1.89**	**38.15**	**38.12**	**3.62**	**4.32**	**6.29**	**6.22**	**1.58**	**4.74**
2306	**1.86**	**1.36**	**0.61**	**1.47**	**5.02**	**4.18**	**1.61**	**1.83**	**5.49**	**5.03**	**1.70**	**2.48**	**3.00**	**2.65**	**1.07**	**2.14**
2309	0.11	-0.36	-2.33	-1.59	0.09	-0.44	-2.41	-1.76	0.12	-0.61	-2.17	-1.84	0.2	-0.56	-1.65	-1.38
2401	**1.92**	**1.86**	**0.64**	**3.4**	**2.42**	**2.28**	**0.88**	**2.97**	**3.41**	**3.34**	**1.2**	**3.88**	**2.29**	**2.19**	**0.83**	**3.21**
2402	0.18	0.14	-1.71	1.61	0.16	0.02	-1.87	0.19	0.17	0.11	-1.78	0.97	0.15	0.09	-1.9	0.86
2403	0.84	0.82	-0.19	4.15	1.29	1.26	0.24	4.13	1.9	1.76	0.64	2.69	1.2	1.09	0.15	2.46
Avg.	**0.94**	**0.68**	**-2.37**	**0.41**	**1.72**	**1.24**	**-2.01**	**0.26**	**1.61**	**1.34**	**-1.73**	**0.58**	**0.7**	**0.49**	**-1.96**	**0.57**
C. V.	**3.28**	**4.73**	**-0.99**	**7.29**	**4.31**	**6.13**	**-1.17**	**10.93**	**3.44**	**4.16**	**-1.22**	**4.51**	**1.76**	**2.58**	**-1.01**	**4.65**

Source: Author's calculation based on ITC database.

Note: Avg- Average, C. V.- Coefficient of Variation.

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