# An Analysis of Growth, Performance and Instability of India's Exports of Food Crops and Food Items during Pre –reform and Reform Periods

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| ARTICLE DETAILS | ABSTRACT |
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| **Article History**<br>*Published Online:* 10 November 2018<br><br>**Keywords**<br>Compound Growth Rate, Instability Index, Semi-log Regression model<br><br>[*]**Corresponding Author**<br>*Email: loganathan.ias8[at]gmail.com* | India has completed two and half decades of economic reforms. There are studies related to impact of reforms on India's foreign trade. Most of the studies have analyzed India's foreign trade as a whole and in terms of value in specific. The present study is an attempt to evaluate the impact of reforms on India's export of food crops and food items in terms of quantity and also value. The impact has measured through decadal value, Compound Growth Rate (CGR), Instability Index (II) and semi-log regression estimation. It has been observed that reforms accelerated exports of all sectors in terms of values. There has been an increasing movement in the export of rice, beverages, sugar, sugar refined, sugar raw and centrifugal, pastry, coffee extracts, sugar confectionary, chocolate products, flour maize, macaroni and malt. There has been ups and down movements in the export of wheat, flour wheat and bran wheat. There are one food crops and nine food items have fallen under low II during overall study period. This number decreased to five food items during period Pre-reform period and again increased to one food crops and eight food items during reform period. It is inferred that the performance of export of food crops and food items in terms of instability index has increased. The estimation of semi-log regression model confirmed that there has been a positive significant change in the export of food crops and food items during reform period. |

## 1. Introduction

Foreign trade has been one of the most significant determinants of economic development in a country. The foreign trade of a country consists of inward and outward movement of goods and services, which result into outflow and inflow of foreign exchange from one country to another country. In globalization era, international trade is a vital part of development strategy and it can be an effective instrument of economic growth, employment generation and poverty alleviation in an economy. The process of globalization has got momentum through the process of economic integration and in the expansion of the volume of international trade. In 1991, the government introduced some changes in its policy on trade, foreign investment, tariffs and taxes under the name of "New Economic Reforms". The main focus of these reforms has been on Liberalization, Openness and Export promotion activity. India's foreign trade export has significantly changed in the reform periods, the major contributor to exports growth has been the manufacturing sector and service sector.

The effect of liberalization on India's foreign trade has greatly influenced. The first important feature is changes in the structure of trade in goods and services. India's export has continuously increased. It was 1.33 billion US $ during 1960-61.After Economic Reform export went up to 17.6 billion US$ during 1991-92.During 2017-18, the total export value registered at 302.8 billion US$. With this background, the present study is an attempt to evaluate the impact of reforms on India's export of food crops and food items in terms of quantity and value. *There are studies related to impact of reforms on India's agriculture trade. These studies have analyzed India's agriculture trade as a whole in terms of value that also without deflating the value .These studies have not analyzed in terms of quantity and commodity specific. The present study has carried to fill those gaps.*

### Objectives of the study:

India has completed two and half decades of economic reforms. Since India is an agrarian economy, it is essential to evaluate the impact of reforms on India's export of food crops and food items. So the objective of this study is, to examine the performance of food crops and food items exports during pre-reform and reform periods.

### Hypothesis:

The following hypothesis has been formulated based on the above objective, the impact of economic reforms on India's export of food crops and food item is not significantly positive.

## 2. Materials and Methods

The study is based on secondary data. To measure performance of food crops and food items during pre-reform and reform periods data have been collected for seventeen commodities viz.macaroni, pastry, rice millet equivalent, ceral breakfast, infant food, sugar confectionary, sugar refined, molasses, rice, beverages, wheat, flour wheat, bran wheat, malt, maize, flour maize and sugar raw and centrifugal from Food and Agriculture Organization website (www.faostat.fao.org) from 1970 to 2013.These data have been deflated by WPI series which has been calculated by researcher by using monthly data available in office of the economic adviser. Following tools have been applied to analyse the data.

### Compound Growth Rate:

This tool is used to measure and compare the growth rate of a variable during particular period of time. The compound growth rate can be calculated by using the following formula.

$$Y_t = ab^t$$

Where $Y_t$ = Value of Variable for the year t.

    t   = Time Variable (1, 2, n) for each year,

    a = Constant

    b = (1+r)

    r = Compound Growth Rate

The log transformation of the above function is:

$$\ln b = \ln(1+r)$$

The compound growth rate in percentage

    (**CGR) = [antilog (lnb)-1]*100**

### Instability Index:

The instability in variable can be measured by different methods, such as Standard Deviation, Co-efficient of variation, Cuddy Della Valle Index (CDI), etc. This study applied CDI to measure instability in a variable. This index is most commonly used measure to find out instability in time series data. This was originally developed by Cuddy and Della Valle in 1978. This index is a better compared to CV, due to its efficiency in adjustment with trend in time series data. So it is better method to calculate instability in time series data. The index can be calculated by using the following method.

$$I_x = SEE/\bar{y} *100$$

    Where $I_x$ = Instability Index

    SEE = Standard Error of the trend line Estimates.

$\bar{y}$ = Average value of the time series data

### Dummy Semi-logarithmic Regression Model:

The dummy variable regression model is an alternative for chow test to test the significant change of the intercept and slope of the model. It is also revealing whether reform influence the export, if influence which was contributed more towards export growth (intercept or slope) change could be found through this estimation.

$\ln \bar{Y} = \alpha + \beta_1$ time+ $\beta_2 D + \beta_3 CD + \mu$ ------overall study period equation

$\ln \bar{Y} = \alpha + \beta_1$ time+$\mu$ ------Pre-reform period equation

$\ln \bar{Y} = (\alpha + \beta_2)_{+} (\beta_1 + \beta_3)$ time+$\mu$ -----Reform period equation

  Where   Ln $\bar{Y}$ = log of Total food crops and food items export,

  D = Dummy Variable

  CD = Interaction of Dummy and Time,

  $\mu$ = Error Term

  $\alpha$ = Intercept,

  $\beta_1$ = Slope co-efficient,

  D=0 for the period 1970 to 1990,

  D=1 for the period 1991 to 2013

  $(\alpha + \beta_2)$ = Reform period intercept

  $(\beta_1 + \beta_3)$ = Reform period slope co-efficient

### 3. Result and Discussion

This section consists of analysis and interpretation of the data on the exports of all the food crops and food items which was given in the table, it explains the decadal value for exports of food crops and food items. It was observed from the table there has been impressive increase in value of food crops and food items to Rs.60637.04crores in 2013 from the meager value of Rs.135.83crores.

**Table No-1: Decadal value for Food crops and Food Items exports value in crores**

| Year | wheat | Flour wheat | Bran wheat | pastry | Rice, millet equivalent | Flour, maize | Infant foods | Sugar raw and centrifugal |
|------|-------|-------------|------------|--------|-------------------------|--------------|--------------|----------------------------|
| 1970 | 0.03 | 3.22 | 0.58 | 0.54 | 7.18 | 0.00 | 0.53 | 21.48 |
| 1980 | 12.76 | 1.99 | 1.80 | 1.68 | 68.05 | 0.00 | 2.21 | 0.62 |
| 1990 | 15.92 | 0.03 | 0.51 | 0.62 | 236.09 | 0.01 | 2.44 | 10.76 |
| 2000 | 244.61 | 89.46 | 38.37 | 20.32 | 1734.59 | 0.04 | 14.06 | 157.86 |
| 2010 | 0.36 | 44.32 | 0.18 | 350.07 | 6012.32 | 14.36 | 57.97 | 650.30 |
| 2013 | 5076.06 | 390.99 | 3.82 | 754.15 | 21784.18 | 63.20 | 81.21 | 825.99 |

*Continuous of table no-1*

| Sugar refined | Malt | Macaroni | Molasses | Sugar confectionary | Beverages | Coffee, extracts | Chocolate, products | Sugar, Total (Raw Equiv.) | Total value of Food crops and food items |
|---------------|------|----------|----------|---------------------|-----------|------------------|---------------------|----------------------------|-------------------------------------------|
| 8.73 | 0.00 | 0.02 | 2.29 | 0.25 | 55.47 | 1.80 | 0.61 | 25.92 | 135.83 |
| 18.69 | 0.00 | 0.00 | 3.18 | 26.90 | 67.75 | 4.95 | 0.02 | 20.77 | 299.43 |
| 0.46 | 0.13 | 0.07 | 7.91 | 0.37 | 140.81 | 15.52 | 0.20 | 12.06 | 680.00 |
| 96.82 | 0.13 | 2.11 | 43.68 | 13.24 | 566.74 | 227.01 | 5.52 | 255.94 | 5245.14 |
| 1596.10 | 12.63 | 8.54 | 259.41 | 114.13 | 2633.94 | 462.69 | 36.07 | 2672.98 | 21039.51 |
| 1662.86 | 13.42 | 20.90 | 88.91 | 202.72 | 3541.21 | 787.62 | 172.47 | 3208.70 | 60637.04 |

*Source: Food and Agriculture Organization*

*Note: All the values are deflated by WPI index calculated by Author based on monthly index*

All displayed values are deflated value. The table no.1 displays the decadal value for food crops and food items. It is

essential to see the value of the individual commodity and group, to understand significant contribution of each

commodities and groups towards agriculture trade. Food crops and food items consists seventeen individual items as given in the table. It was observed from the table that the highest total value of foods crops and food items exported in 2013 at Rs.60709.14 crores. The lowest total value of foods crops and food items has observed in 1970 at Rs.135.83 crores. It is clear from the *table the acceleration of total value of food crops and food items started after 1990.*The total value of food crops and food items was Rs.681.5 crores in 1990. It increased more than seven fold reached at Rs.5251.64 crores in 2000.It is noted from the table that the highest value of *wheat* exported in 2013 at Rs.5076.06 crores and lowest value of export registered in 1970 at Rs.0.03 crores. The wheat export increased fifteen times from Rs.15.92 crores to Rs.244.61crores in 2000. The *flour wheat* is the second individual commodity in this group. The highest value of flour wheat was observed in 2013 at Rs.390.99 crores. The lowest value was observed at Rs.0.03 crores in 1990. The flour wheat export increased around three thousand time from Rs.0.03 crores in 1990 to Rs.89.46 crores in 2000. But it is decreased to Rs.44.32 crores in 2010. It was observed from the table the highest value of b*ran wheat* export observed in 2000 at Rs.38.37 crores .The lowest value was observed in 2010 at Rs.0.18 crores. The export of bran wheat increased 75 times in 2010 compare to Rs.0.51 crores in 1990.

The highest value of export of *macaroni* registered at Rs.20.90 crores in 2013. The export of macaroni increased thirty times in 2000 at Rs.2.11 crores compare to Rs.0.07 crores in 1990.It was observed from table that the highest value of *pastry* exported at Rs.754.15 crores in 2013. The lowest value of pastry export has registered at Rs.0.54 crores in 1970. The acceleration of pastry export started after 1990. The value of pastry export increased 33 times from Rs.0.62 crores in 1990 to Rs.20.32 crores in 2000. The highest value of *rice* export was observed at Rs.21784.18 crores in 2013. The lowest value was observed at Rs.7.18 crores. The speeding up of rice export started from Rs.236.09 crores in 1990 to Rs.1734.59 crores in 2000. The highest value of *malt* export was observed in 2013 at Rs.13.42 crores. It is clear from the table no.1 the export of malt is zero during 1970 and 1980. The highest value of *flour maize* was observed in 2013 at Rs.63.20 crores. It was observed from the table no.1 the highest value of *Infant foods* export registered in 2013 at Rs.81.21 crores. The lowest value was observed at Rs.0.53 crores in 1970. It is clear from the table no.1 that *there has been increasing trend observed in export of infant foods*. The highest export value *of sugar raw and centrifugal* was observed at Rs.825.99 crores in 2013 and lowest value was observed at Rs.0.62 crores in 1980. The stepping up of sugar raw and centrifugal is started from Rs.0.62 crores in 1980 to Rs.10.76 crores in 1990 that is 17 fold increased. The highest export value of sugar refined was observed at Rs.1662.86 crores in 2013.

The lowest value of *sugar refined* export is noted at Rs.0.46 crores in 1990 this value increased more than two hundred times and reached to Rs.96.82 crores in 2000. It was observed from the table no.1 that the highest value of *molasses* export was observed in 1970 at Rs.2.29 crores. There was an ups and down trend was observed in the export of molasses. The highest value of *sugar confectionary* export

has registered at Rs.202.72 crores in 2013. The lowest value was observed at Rs.0.25 crores value in 1970. The sugar confectionary export increased 35 times and reached Rs.13.24 crores in 2000 from Rs.0.37 crores in 1990.It was observed from the table no.1 that the highest value of *beverages* export is reached in 2013 at Rs.3545.21 crores, there was an increasing trend was observed based on the decadal value of beverages export. The lowest value of beverages export was observed at Rs.55.47 crores. The highest value of export of *coffee extracts* was observed at Rs.787.62 crores in 2013 and the lowest value was observed at Rs.1.80 crores in 1970. There has been an upward trend was observed in export of Coffee extracts based on decadal values.

It was observed from the table no.1 that the highest value of chocolate export has registered at Rs.172.47 crores in 2013. The lowest value was observed at Rs.0.02 crores in 1980. There was an increasing trend observed after 2000.Itwas observed from the table no.1 that the highest export value *sugar (raw equivalent)* has registered in 2013 at Rs.3208.70 crores and the lowest value was observed at Rs.20.77 crores. The export of sugar (raw equivalent) increased 21 times from Rs.12.06 crores in 1990 to Rs.255.94 crores in 2000.

## 4. CGR for Export of Food Crops and Food Items

The compound Growth Rate (CGR) has classified into three categories viz. low CGR, Medium CGR and high CGR for the purpose of comparison. Low CGR is defined as the values of CGR with less than or equal to 10 percent. Medium CGR is defined as the value of CGR is more than 10 percent and less than or equal to 20 percent. High CGR is with the value of more than 20 percent. The classification has made based on quantity at the same time CGR in terms of value also has given. Table no.2 shows that the CGR for export of food crops and food items in terms of quantity and value. There were seventeen commodities come under this group.

### Overall study period (1970-2013)

The compound growth rate calculated for this period to consider as a reference period. Since it has includes the both period that is pre-reform and reform period. The export CGR of wheat (5.23), bran wheat (2.32), infant food (3.35), sugar refined (3.97) and molasses (7.25) have fallen under the low CGR commodities. The export CGR of macaroni (18.64), pastry (12.29), rice millet equivalent (15.02), ceral breakfast (13.35), malt (16.88), sugar raw and centrifugal (12.97), sugar confectionary (13.31), rice (15.02) and total food crops (14.56) was grouped under medium CGR. The exports CGR of flour wheat (23.36), maize (39.51) and flour maize (31.39) have fallen under the high CGR.

### Pre-reform period (1970-1991)

The compound growth rate calculated for this period to compare export performance of food crops and food items with reform period performance. The export CGR of flour wheat (-12.01), bran wheat (-29.03), pastry (0.09), malt (0.13), maize (-4.11), flour maize (7.89), infant food (5.54), sugar confectionary (0.3), sugar refined (-14.87), molasses (-5.63), beverages (-4.88), and total food crops (6.50) have grouped under low CGR food crops and food items. The exports CGR

of wheat (14.33), cereal breakfast (11.18) and sugar raw equivalent (12.50) have fallen under the medium CGR. The exports CGR of Macaroni (22.14) rice millet equitant (21.28),

rice (21.28) and sugar raw and centrifugal (31.75) have grouped under the high CGR commodities.

**Table no.2: CGR for Export of Food Crops and Food Items in Terms of Quantity and Value**

| Product/ Period | Low CGR in terms of quantity and value | Medium CGR in terms of quantity and value | High CGR in terms of quantity and value |
|---|---|---|---|
| **Overall study period 1970 to 2013** | Wheat (5.23)(11.18) Bran wheat(2.32)(4.49) Infant food (3.35)(11.51) Sugar refined (3.97)(9.63) Molasses (7.25)(13.20) | Macaroni (18.64)(13.88) Pastry(12.29)(19.96) Ceral breakfast(13.35)(12.20) Malt (16.88)(9.30) Sugar raw and centrifugal (12.97)(15.25) Sugar confectionary (13.31)(16.99) Rice (15.02)(21.04) Total foods crops (14.56)(13.45) | Flour wheat  (23.36)(14.45) Maize (39.51)(15.20) Flour maize (31.39)(9.30) |
| **Pre-reform period 1970 to 1991** | Flour wheat (-12.01) (-1.39) Bran wheat (-29.03) (11.06) Pastry (0.09) (4.39) Malt (0.13) (-6.48) Maize(-4.11) (1.25) Flour maize  (7.89) (14.61) Infant food (5.54) (12.52) Sugar raw and centrifugal (31.75)(-8.78) Sugar confectionary (0.300) (8.98) Sugar refined (-14.87) (-12.19) Molasses (-5.63) (8.00) Beverages (-4.88) (5.02) Total foods crops (6.50) (8.87) | Wheat (14.33) (14.33) Ceral breakfast (11.18) (12.50) Sugar raw equivalent (12.15) (20.22) | Macaroni (22.14) (-2.76) Rice (21.28) (28.91) |
| **Reform period 1992 to 2013** | Wheat (6.28) (9.85) Bran wheat (-6.95) (-2.07) Infant food (4.06) (14.68) Molasses (10.73) (19.48) Rice (9.08) (18.53) Sugar raw equivalent (8.50) (10.07) | Flour wheat (13.42) (24.48) Ceral breakfast (16.53) (0.00) Sugar raw and centrifugal (15.95) (25.10) Sugar refined (14.79) (23.98) Total foods crops (15.00) (19.24) | Macaroni (25.10) (32.18) Pastry (29.04) (38.54) Malt (47.99) (21.04) Maize (61.28) (25.00) Flour maize (29.04) (27.88) Sugar confectionary (25.60) (32.04) Beverages (27.60) (16.53) |

*Source: Compiled from secondary data*
*Note: (---) indicates CGR value in terms of Quantity and Value*

**Reform period (1992 to 2013)**

The compound growth rate calculated for this period is to compare export performance of food crops and food items during reform period. The exports CGR of wheat (6.28), bran wheat (-6.95), rice millet equivalent (9.08), infant food (4.06), molasses (10.73), rice (9.08) and sugar raw equivalent (5.6) have come under the low CGR. The export CGR of flour wheat (13.42), cereal breakfast (16.53), sugar raw and centrifugal (15.95), sugar refined (14.79) and total food crops and food items (15.20) have listed under medium CGR. The exports CGR of Macaroni (25.10), pastry (29.04), malt (47.99); maize (61.28), flour maize (29.04), sugar confectionary (25.06) and beverage (27.60) have registered under high CGR food crops and food items.

Overall, *the exports CGR of some of the commodities registered negative value during pre-reform period and it became positive during reform period for example flour wheat (-12.01) , bran wheat (-29.03), maize  (-4.11), sugar raw and centrifugal sugar refined (-14.87), molasses (-5.63), beverages (-4.88), to flour wheat (13.42) pastry (29.04), malt (47.99), maize (61.28), flour maize (29.04), sugar confectionary (25.60) and beverage (27.60) during reform period.* It was observed from the table no.2 that number of commodities listed under

low CGR during 1970 to 1991 is fourteen which is higher than number of commodities listed under low CGR during 1992 to 2013 and reference period 1970 to 2013. It tells that export growth of commodities have increased during reform period which leads to decreased of the number of commodities listed under low CGR during reform period which was observed for reference period also. It was observed from table no.2 the following commodities pastry, malt, ,maize, flour maize, sugar confectionary and beverages have shifted from low CGR commodities to high CGR commodities during reform period ,mainly the export of beverage has increased from -4.88 percentage pre-reform period to 27.60 percentages in reform period. At the same time some of product registered high CGR during reform period were shifted to low CGR commodities during reform period namely rice millet equivalent (9.08) and rice (9.08).

*It is also noted from table no.2 that the following commodities viz. flour, wheat, sugar raw and centrifugal and sugar refined were converged from low CGR list to medium CGR commodities during 1991 to 2013.It was observed from the table that the overall eleven commodities have grouped under the medium CGR and high CGR, which clearly indicates that reform has increased the growth rate of export of food crops and food items, the commodities are flour wheat (13.42)*

*, cereal breakfast (10.53), sugar raw and centrifugal (15.95), sugar refund (14.76) have fallen under medium CGR. Macaroni (25.40), pastry (29.04), sugar confectionary (25.60) and beverage (27.60) have fallen under high CGR.*

## 5. Instability Index for Export of Food Crops and Food Items

The export instability index is classified into three categories viz. low instability index, medium instability index and high instability index for the purpose of comparison. Low instability index is defined as the value of instability index with less than or equal to 2.Medium instability index is with an index of more than 2 and less than or equal to 5.High instability index is defined with the value of more than 5.

### Overall study period (1970-2013)

The table no.3 explains Instability Index (II) for export of food crops and food items in terms of quantity and value. The instability index for export of macaroni (1.53), pastry (1.87), rice millet equivalent (1.20), cereal breakfast (1.11), infant food (0.60), sugar confectionary (1.73), sugar refined (1.47), molasses (1.59), rice (1.20) and beverages (1.11) have come under low Instability index.

There is a high difference between instability index in terms of quantity and value (6.94) for pastry. It shows that there would be high price movement for pastry. The export instability index for wheat (2.58), flour wheat (2.58), bran wheat (2.48), malt (2.39), maize (2.24), flour maize (2.07) and sugar raw and centrifugal (2.17) has fallen under the medium instability index. There is no commodity with high instability index. The II in terms of value for export of wheat (3.15), bran wheat (4.15), malt (2.58), maize (2.50) and flour maize (2.45) have been observed higher than the instability index in terms of quantity during this period.

### Pre-reform period (1970-1991)

The instability index for the export of bran wheat (2.06), macaroni (0.05), pastry (1.96), rice millet equivalent (1.26), cereal breakfast (1.10) and total foods crops (1.50) have been listed under the low instability index. The export II in terms of value for bran wheat (5.41), macaroni (1.47), rice millet equivalent(1.82), cereal breakfast (1.30) and total food crops(6.56) have registered higher value than instability index in terms of quantity. Sugar raw and centrifugal (3.27), sugar refined (4.94), molasses (5.07), rice (3.95) and beverage (4.77), malt (5.19), maize (8.46) and infant food (2.60) have fallen under the medium instability index. The export instability index in terms of quantity for wheat (7.01), flour wheat (11.57), flour maize (16.52), and sugar confectionary (7.13) have listed under high instability food crops and food items. The export instability index in terms of value was higher than export instability index in terms of quantity for sugar raw and centrifugal (8.56) sugar refined (9.03) and sugar confectionary (8.20) during reform period.

**Table no.3: Instability Index for Export of Food Crops and Food Items in Terms of Quantity and Value**

| Product/ Period | Low II in terms of quantity and value | Medium II in terms of quantity and value | High II in terms of quantity and value |
|---|---|---|---|
| **Overall study period 1970 to 2013** | Macaroni(1.53) (1.63)<br>Pastry (1.87) (6.94)<br>Rice millet equivalent (1.20) (1.88)<br>Ceral breakfast (1.11) (1.40)<br>Infant food (0.60) (1.04)<br>Sugar confectionary (1.73) (1.55)<br>Sugar refined (1.47) (1.77)<br>molasses (1.59) (1.84)<br>Rice (1.20) (1.73)<br>Beverages (1.11) (1.21)<br>Total foods crops (1.60) (6.56) | Wheat (2.58) (3.15)<br>Flour wheat (2.58) (1.95)<br>Bran wheat (2.48) (4.13)<br>Malt (2.39) (2.58)<br>Maize (2.24) (2.)<br>Flour maize (2.07) (2.45)<br>Sugar raw and centrifugal (2.17) (0.01) | |
| **Pre-reform period 1970 to 1991** | Bran wheat (2.06) (5.41)<br>Macaroni (0.05) (1.47)<br>Pastry (1.96) (1.84)<br>Rice millet equivalent (1.26) (1.82)<br>Ceral breakfast (1.10) (1.30)<br>Total foods crops (1.50) (1.70) | Malt (5.19) (0.34)<br>Maize (8.46) (4.25)<br>Infant food (2.60) (2.08)<br>Sugar raw and centrifugal (2.27) (8.56)<br>Sugar refined (4.94) (9.03)<br>Molasses (5.07) (4.31)<br>Rice (3.95) (1.26)<br>Beverages (4.77) (1.12) | Wheat (7.01) (3.89)<br>Flour wheat (11.57) (8.10)<br>Flour maize (16.52) (14.28)<br>Sugar confectionary (7.13) (8.20) |

| **Reform period 1992 to 2013** | Macaroni (1.47) (2.02)<br>Pastry (1.84) (12.83)<br>Rice millet equivalent (1.82) (2.86)<br>Ceral breakfast (0.88) (1.50)<br>Maize (0.23) (2.40)<br>Infant food (1.06) (1.38)<br>Sugar confectionary (1.67) (1.90)<br>Rice (1.83) (2.50)<br>Beverages (1.04) (1.48)<br>Total foods crops (1.55) (2.42) | Wheat (4.41) (5.54)<br>Flour wheat (4.22) (3.50)<br>Malt (3.20) (3.90)<br>Flour maize (2.53) (3.56)<br>Sugar raw and centrifugal (3.91) (3.69)<br>Sugar refined (2.49) (2.70)<br>molasses (3.31) (3.33) | Bran wheat (8.12) (8.06) |

*Source: Compiled from secondary data*

*Note: (---) indicates Instability Index (II) value in terms of Quantity and Value*

**Reform period (1992 to 2013)**

The export instability index in terms of quantity for macaroni (1.47), pastry (1.84), rice millet equivalent (1.82), cereal breakfast (0.88), maize (0.23), infant food (1.06), sugar confectionary (1.67), beverages (1.04), and total food crops and food items (1.55) have come under low instability index food crops and items. The export instability index for wheat (4.41), flour wheat (4.22), malt (3.20), flour maize (2.53), sugar raw and centrifugal (3.91), sugar refined (2.49) and molasses (3.31) have fallen under medium instability index .The bran wheat (8.12) has observed under the high instability index food crops and food items.

There were ten food crops and food items have fallen under low II during Overall study period. This number decreased to five during pre-reform period and again increased to nine food crops and food items during reform period. It is inferred that the performances of export of food crops and food items in terms of instability index have increased. Because low instability index indicates that continuous increase of export of food crops and food items which could increase the foreign reserve of the country. It is also observed that there were seven food crops and food items listed under medium II during overall study period. This number increased to eight during pre-reform period and remaining same during reform period. Only one item has fallen under high instability index during reform period. But it was four during pre–reform period.

**6. Hypothesis Testing**

In this study, semi-log regression model is applied. The deflated value has taken for regression.

*Semi-log regression equation for overall period*

$$\ln \bar{Y} = 4.794 + 0.610 \text{ time} - 0.521 D + 0.861 CD$$

$$(0.000) \quad (0.00) \quad (0.020) \quad (0.00) \quad R^2 = 0.942 \quad \text{----------equation-1}$$

Ln Ȳ = Total value of food crops and food items export,
D = Dummy Variable
CD = Interaction of Dummy and Time.
From the equation-1 the following equation can be derive
Semi-log *regression equation for pre-reform period*

$$\ln \bar{Y} = 4.794 + 0.610 \text{ time} \text{------------equation-2}$$

Semi-log *regression equation for reform period*

$$\ln \bar{Y} = 4.273 + 1.471 \text{ time} \text{------------equation-3}$$

Equation-1 explains the relationship between time and log of total value of food crops and food items. In this equation

p-value are given in parenthesis. The intercept and slope values are significant at 5 per cent significant level. It explained that the reform shift the intercept downward and slope upward. Since this is a semi-log regression model antilog of coefficient value directly gave, the percentage change of total value of food crops and food items as an increase of one year. The equation-2 gave intercept and slope value for pre-reform period. The antilog of intercept (4.794) is Rs.120.78 crores, this is the median export value during pre-reform period. The antilog of slope coefficient (0.610) is 1.84 percent, it is inferred that 1.84 percent of total export increased as an increase of one year during pre-reform period. The equation-3 shows that intercept and slope value during reform period. The antilog of intercept (4.273) is Rs.71.73 crores, this is the median export value during reform period. The antilog of slope coefficient (1.471) is 4.37 percent; it is concluded that 4.37 percent of total export increased as an increase of one year during reform period. *The estimation of semi-log regression model confirmed that there has been a positive significant change in the export of food crops and food items during reform period.*

**7. Summary**

It is clear from the result and discussion that the reform has positive impact on export of total food crops and food items. The acceleration of total value of food crops and food items was observed after 1990, total value of food crops export has increased from Rs.680 crores in 1990 to Rs.5245.14 crores in 2000.There has been an increasing movement was observed for export of rice, beverages, sugar, sugar refined, sugar raw and centrifugal, pastry, coffee extracts, sugar confectionary, chocolate products, flour maize, macaroni and malt. There has been an ups and down movements was observed for export of wheat, flour wheat and bran wheat. It was observed from the table no-2 that number of commodities listed under low CGR from 1970 to 1991 is fourteen which is higher than number of commodities listed under low CGR from 1992 to 2013 and overall study period 1970 to 2013. It tells that export growth of commodities have increased during reform period which resulted in decreased of the number of commodities under low CGR during reform period .The exports CGR of some of the commodities have registered negative growth rate during pre-reform period and it became positive during reform period viz. *flour wheat (-12.01) bran wheat (-29.03), maize (-4.11), sugar raw and centrifugal sugar refined (-14.87), molasses (-5.63), beverages (-4.88), flour wheat (13.42) pastry (29.04), malt (47.99), maize (61.28), flour maize (29.04), sugar confectionary (25.60) and beverages (27.60) .*

The study reveals that ten food crops and food items have fallen under low II during overall study period. This number decreased to five during pre-reform period and again increased to nine food crops and food items during reform period. It is inferred that the performance of export of food crops and food items in terms of instability index has increased. Because of low instability there was a continuous increase of export of food crops and food items which could increase the foreign reserve of the country. It is also observed that there were seven food crops and food items listed under medium II during overall study period, this number increased to eight during pre-reform period and remaining same during reform period. Only one item (Bran wheat) has fallen under high instability index during reform period. But it was four during pre–reform period. The export instability index in terms of quantity for macaroni (1.47), pastry (1.84), rice millet equivalent (1.82), cereal breakfast (0.88), maize (0.23), infant food (1.06), sugar confectionary (1.67), beverage (1.04) have fallen under low II during reform period, three has been a significant change in the export of food crops and food items during reform period. The estimation of semi-log regression model confirmed that there has been a positive significant change in the export of food crops and food items during reform period.

## References

1. Arvindvirmani, "India's External Reforms: Modest Globalization, Significant Gains", Economic and Political Weekly, 32(32), 1997.PP-10-12.
2. Kumar Singh k (2012)"Impact of liberalization on agricultural trade in India"(Doctoral thesis, V.B.S. Purvanchal University) Retrieved from http://shodhganga.inflibnet.ac.in
3. Office of Economic Advisor (2011). *Whole Sale Price Index (WPI) data.* Ministry of Commerce and Industry, Government of India. New Delhi. http://eaindustry.nic.in/
4. Rangarajan c and Prachi Mishra, "India's external sector Do we need to worry?" Economic and Political Weekly, 48(7), 2011.PP-5-8.
5. RakeshSihmer, Growth and instability in Agricultural Production in Haryana. A district level, Analysis, international Journal of Scientific and Research Publications 4(7), 2014.PP-1-2.
6. Tandon, Anjali, "Growth, Performance and Instability of India's Agricultural Exports: A Pre and Post Reform Analysis", Indian Economic Journal, 53(4), 2005, PP-74-86.
7. Gujarati and Sangeetha(2011) ,Basic econometrics,PP-325-328,Tata McGrahill, New Delhi