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The Export Pattern of Commercial Crops and Related Products of India: A Comparative Study

V. Loganathan

Assistant Professor, Department of Economics, DDE
Madurai Kamaraj University, Madurai, Tamil Nadu, India

 <https://orcid.org/0000-0003-2802-6723>

Abstract

India has completed two and a half decades of economic reforms. There are studies related to the impact of reforms on India's export. 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 commercial crops and related products in India, in terms of quantity and value. The impact has been measured through decadal value, Compound Growth Rate (CGR), Instability Index (II) and Dummy Semi-Logarithmic Regression Estimation. It has been observed that reforms accelerated the export performance of all commercial crops during the reform period comparable to the pre-reform and overall study periods. During the reform period, some of the commercial crops viz. Natural rubber (12.50), silk (8.76), jute (10.84) and tobacco unmanufactured (6.50) have moved to positive growth rate from a negative growth rate during the pre-reform period and three products were moved from low CGR to high CGR viz. Cotton lint (20.92), rubber natural dry (38.40) and textile fibers (20.32) during the reform period. The Instability Index for all the commercial crops has decreased during the reform period, compared to the pre-reform period, except rubber natural dry (3.89) but compared to the overall period the Instability Index has registered a high value during the reform period. The jute and silk have moved to a low Instability Index group during the reform period from the medium Instability Index during the pre-reform period. The rubber natural has moved to a medium Instability Index during the reform period from a low Instability Index group during the pre-reform period. The estimation of the semi-log regression model has confirmed that there has been a positive significant change in the export of commercial crop items during the reform period.

Key Words: Compound Growth Rate (CGR), Instability Index (II) and Dummy Semi-Logarithmic Regression Model (DSRM), Reform-reform, Exports.

Introduction

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 (Amandep kaur 2012, Loganathan and Stanly Joseph 2018). The exports of agriculture have decelerated and Imports of agriculture sector accelerated in the post reform period (Anjali Tandon 2005, Pusbalata Singh 2014). Though, India has unfavourable balance of trade in overall trade position, it has favourable balance of trade particularly agricultural trade. For this favourable trade balance, export of animal products and commercial products have been playing vital role. In 2013, the highest value of percentage share is observed for animal products export at 42.78 per cent followed by commercial crops at 27.30 per cent, food crops, and food items at 21.49 per cent, plantation crops at 1.76 per cent and pulses at 1.21 per cent (Loganathan V, 2023).

The highest value of the percentage share of commercial crops in total agricultural export at 42.96 per cent in 1990. The lowest value is noted for the year 1999 at 3.81 per cent. The percentage share of commercial crops in total agricultural export is observed between 42.96 per cent and 3.81 per cent during the study period. The linear trend line shows an upward movement of the percentage share of commercial crops in total agricultural export around the mean value and a slight level of upward movement. It is also noted from the figure for the years 1976, 1990 and 2007, the percentage share of commercial crops is registered more than 40 per cent in the total agricultural export. (Loganathan V, 2023). On the other hand, India is also importing few of the commercial products. In 2017, the highest value of per cent share is observed for oilseeds and oil import at 40.45 per cent followed by commercial crops at 27.87 per cent, pulses at 14.03 and food crops and food items at 10.59 per cent (Loganathan, 2023). With the above background, the present study devoted to discuss the export pattern of commercial crops and related products in India during pre-reform and reform periods.

Materials and Methods

The study is based on secondary data. To analyse the export pattern of commercial crops and related products during pre-reform and reform periods. The data have been collected for exports of cotton lint, jute, natural rubber, textiles, silk, rubber natural dry, sugarcane and tobacco from Food and Agriculture Organization website (www.fao.org) from 1970 to 2017. These data have been deflated by the WPI series which has been calculated by the researcher by using monthly data available in the office of the economic adviser (Office of Economic Advisor., 2011). The following tools have been applied to analyses the data.

Compound Growth Rate : It is applied to measure and compare the growth rate of a variable during a particular period (Nehru, S. 2012). The compound growth rate can be calculated by using the following formula.

$$Y_t = abt$$

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

$$(CGR) = [\text{antilog}(\ln b) - 1] * 100$$

Instability Index

The instability in a variable can be measured by different methods, such as Standard Deviation, Coefficient of variation, Cuddy Della Valle Index (CDI) (Rakesh, Sihmer., 2014), etc. This study applied CDI to measure instability in a variable. This index is the 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 better compared to CV, due to its efficiency in adjustment with the trend in time series data. So it is a better method to calculate instability in time series data. The index can be calculated by using the following method.

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

Where

I_x = Instability Index

SEE = Standard Error of the trend line Estimates.

Y = Average value of the time-series data

Dummy Semi-logarithmic Regression Model

It is an alternative for the Chow Test to test the significant change of the intercept and slope of the model (Gujarati, Damodar and Sangeetha N., 2011). It is also revealing whether reform influences the export of commercial crops if influence which was contributed more towards export growth (intercept or slope) change could be found through this estimation.

$$\ln \square = \alpha + \beta_1 \text{time} + \beta_2 D + \beta_3 CD + \mu$$

-----overall study period equation

$$\ln \square = \alpha + \beta_1 \text{time} + \mu$$

-----Pre-reform period equation

$$\ln \square = (\alpha + \beta_2) + (\beta_1 + \beta_3) \text{time} + \mu$$

-----Reform period equation

Where $\ln \square = \log$ of Total Fruits import,
 D = Dummy Variable
 CD = Interaction of Dummy and Time,
 μ = Error Term
 α = Intercept,
 β_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

Result and Discussion

The export performance of commercial crops during pre-reform and reform periods has been discussed below.

Decadal Value for Commercial Crops Export

Table No.1 shows the decadal export value of commercial crops. The total value of commercial crops export consists of export value of cotton lint, jute, natural rubber, textiles, silk, rubber natural dry, sugarcane and tobacco production. There is an increasing trend as observed in the total value of commercial crops export excluding year 2000 and sudden fall has observed in 2000 at Rs.705.4 crore. The highest value of total commercial crops export has noted at Rs.36946.79 crore in 2017 and lowest value has observed at Rs.95.13 crore in 1970. Among the commercial crops, the export value of

textile fibers has occupied first position, followed by cotton lint, sugarcane, tobacco products, natural rubber, rubber natural dry, silk and jute. The highest value of export of cotton lint has been observed at Rs.11660.02 crore in 2017 and lowest value has been observed at Rs.18.14 crore in 1970. There is an increasing trend observed in the export of cotton lint excluding the year 2000. In 2010 export value of jute has registered the highest value at Rs.152.99 crore and lowest value has noted at Rs.1.82 crore in 1980. There is an ups and down trends presented on the export value of jute for the all decadal.

It is displayed in table no.1 as the highest value of natural rubber export reaching Rs.311.72 crore in 2013 and lowest value observed at Rs.0.01 crore was in 1980. There is an increasing trend has noted in the export value of natural rubber for all decadal value. In 2017 the export value of textile fibers has reached at Rs.20906.22 crore and the lowest value has been observed at Rs.43.51 crore in 1970. There is an increasing trend observed in export value of textile fiber excluding the year 2000. The highest value of silk export was observed in the year 2017 at Rs.121.46 crore and lowest value was noted at Rs.0.42 crore for the year 1980. There is an ups and down movement observed for the export value of silk. At 2017, the export value of tobacco product has reached the highest value at Rs.433.31 crore. There is an increasing trend noted in the export value of tobacco products based on decadal value. The highest value of sugarcane, rubber natural dry, export has noted at Rs.3208.70 crore, Rs.251.78 in 2017 and the lowest value at Rs.12.06 crore, Rs.0.00 crore in 2000 respectively.

Table no.1
Decadal Value for Commercial Crops Export (Rs in Crores)

Year	Cotton Lint	Jute	Natural Rubber	Textile Fibers	Silk	Tobacco Production	Rubber Natural	Sugarcane	Total Commercial Crops
1970	18.14	5.83	0.02	43.51	0.65	1.05	0.01	25.92	95.13
1980	76.15	1.82	0.01	69.20	0.42	3.83	0.01	20.77	172.21
1990	571.38	12.11	0.02	499.95	1.49	7.10	0.00	12.06	1104.11
2000	40.25	6.82	11.55	276.82	51.09	53.99	8.95	255.94	705.41
2010	8147.52	152.99	185.32	12614.64	43.10	317.88	93.42	2672.98	24227.85
2017	11660.02	53.58	311.72	20906.22	121.46	433.31	251.78	3208.70	36946.79

Source: Food and Agriculture organization, **Note:** All the value are deflated by Wholesale Price Index

CGR of Export of Commercial Crops Overall Study Period (1970 to 2017)

Table no.2 displays the CGR for the export of commercial crops. The CGR of export of cotton lint (9.08), jute (-0.70), tobacco unmanufactured (2.63), natural rubber (6.00), textile fibers (7.03), sugarcane (4.08) and silk (1.61) have listed under low CGR commercial crops during 1970 to 2013. The CGR of export of rubber natural dry (19.96) and total commercial crops (11.05) have grouped under the medium CGR commercial crops. The CGR of export in terms of value is higher than export CGR in terms of quantity for all commercial crops, which shows that the price of commercial crops has been increased from 1970 to 2017. It has been inferred that none of the commercial crops has listed under the high CGR commercial crops.

Pre-reform Period (1970 to 1991)

The CGR of export of cotton lint (4.70), jute (-6.85), tobacco unmanufactured (-0.69), rubber natural dry (12.15), natural rubber (-18.20), textile fibers (0.60), silk (-3.63) and total commercial crops (5.40) are grouped under the low CGR commercial crops. None of the commercial crops have fallen under the medium CGR and high CGR. The CGR of export of commercial crops in terms of value has registered higher value than CGR of export of commercial crops in terms of quantity for all the commercial crops.

Reform Period (1992 to 2017)

The CGR of export of tobacco unmanufactured (6.50), silk (8.76) and sugarcane (3.35) are listed under low CGR commercial crops during the reform period. The CGR of export of jute (10.84),

natural rubber (12.50) and total Commercial crops (15.25) have been grouped under the medium CGR commercial crops. The CGR of export of cotton lint (20.92), rubber natural dry (38.40) and textile fibers (20.32) have come under high CGR in commercial crops. The CGR for all commercial crops is noted high value in terms of value compared to in terms of quantity during the reform period.

In summary, the export performance of all commercial crops was observed in a healthy position during the reform period comparable to the pre-reform and overall study periods. During reform period some of the commercial crops viz. natural rubber (12.50), silk (8.76), jute (10.84) and tobacco unmanufactured (6.50) have moved to positive growth rate from negative growth rate during pre-reform period and three products were moved from low CGR to high CGR viz. cotton lint (20.92), rubber natural dry (38.40) and textile fibers (20.32) during reform period.

Instability Index of Export of Commercial Crops Overall Study Period (1970 to 2017)

The Instability Index for export of jute (1.05), tobacco unmanufactured (0.44), rubber natural dry (1.89), natural rubber (1.73), textile fibers (1.77), sugar total (1.61), silk (0.78) and total commercial crops (1.50) are grouped under low Instability Index during overall study period. There are no commercial crops come under the medium Instability Index during this period. The Instability Index, in terms of value, has a higher value than the Instability Index in terms of quantity of all commercial crops except natural rubber (1.53). The cotton lint (18.51) has come under the high Instability Index during this period.

Table No. 2
Compound Growth Rate of Commercial Crops
(in terms of quantity and value)

Product/ Period	Low Compound Growth Rate	Medium Compound Growth Rate	High Compound Growth Rate
Overall Study Period 1970 to 2017	Cotton lint (9.08) (14.91) Jute (-0.70) (5.33) Tobacco, unmanufactured (2.63) (17.79) Natural rubber (11.25) (22.50) Textile fibers (7.03) (14.79) Sugarcane (4.08) (9.63) Silk (1.61) (11.96)	Rubber natural dry (19.96) (23.04) Total commercial crops (10.05) (11.25)	
Per-reform Period 1970 to 1991	Cotton lint (4.70) (13.08) Jute (-6.85) (2.17) Tobacco, unmanufactured (-0.69) (17.70) Rubber natural dry (12.50) (38.40) Textile fibers (0.60) (9.08) Sugarcane (2.32) (-10.95) Silk (-3.63) (9.30) Total commercial crops (2.20) (4.49)	Natural rubber (12.50) (35.79)	
Reform Period 1992 to 2017	Tobacco, unmanufactured (6.50) (20.92) Sugarcane (3.35) (24.23) Silk (8.76) (11.96)	Jute (10.84) (17.92) Total commercial crops (15.20) (27.88)	Cotton lint (20.92) (29.69) Rubber natural dry (38.40) (40.00) Textile fibers (20.32) (30.08)

Source: Compiled from secondary data

Note: (---) Indicates CGR value in terms of Quantity and Value

Table No.3
Instability Index of Export of Commercial Crops
(in terms of quantity and value)

Product/ Period	Low Instability Index	Medium Instability Index	High Instability Index
Overall Study Period 1970 to 2017	Jute (1.05) (1.74) Tobacco, Unmanufactured (0.44) (0.64) Rubber natural Dry (1.89) (1.90) Natural rubber (1.73) (1.53) Textile Fibers (1.77) (2.14) Sugarcane (1.61) (2.05) Silk (0.78) (1.11) Total commercial crops (1.60) (1.98)	-	Cotton lint (18.51) (1.99)

Per-reform Period 1970 to 1991	Tobacco, Unmanufactured (0.93) (1.10) Rubber natural Dry (0.30) (1.20)	Cotton lint (4.17) (5.05) Jute (2.99) (2.96) Textile fibers (2.55) (3.88) Sugar total (3.41) (4.78) Silk (2.50) (3.29) Total commercial crops (2.60) (3.29)	Natural rubber (12.25) (7.04)
Reform Period 1992 to 2017	Jute (1.79) (0.17) Tobacco, Unmanufactured (0.59) (0.79) Silk (1.74) (2.03)	Cotton lint (2.33) (2.69) Rubber natural Dry (3.89)(4.50) Textile fibers (2.29) (2.91) Sugarcane (2.81) (3.15) Total commercial crops (2.50) (2.63)	Natural rubber (5.27) (1.99)

Source: Compiled from Secondary Data

Note: (---) Indicates Instability Index Value in terms of Quantity and Value

Pre-reform Period (1970 to 1991)

The Instability Index in terms of quantity for export of tobacco unmanufactured (0.93), rubber natural dry (0.01) have come under low II commercial crops (2.5). The cotton lint (4.17), jute (2.99), textile fibers (2.55) and silk (2.50) and total commercial crops (2.50) have grouped under medium Instability Index during the period. The Instability Index in terms of quantity of natural rubber (12.25) has listed under the high Instability Index. The Instability Index in terms of value has registered a higher value than the Instability Index in terms of quantity for all commercial crops except jute (2.96) and natural rubber (7.04).

Reform Period (1992 to 2017)

The Instability Index of export in terms of quantity for jute (1.79), tobacco unmanufactured (0.59) and silk (1.74) are grouped under low Instability Index commercial crops. The cotton lint (2.33), rubber natural dry (3.89) and textile fibers (2.29) and sugarcane (2.81) and total commercial crops (2.50) are fallen under the medium Instability Index and natural rubbers (5.27) are listed under high Instability Index during the pre-reform period.

The Instability Index for all the commercial crops has decreased during the reform period, compared to the pre-reform period, except rubber natural dry (3.89) but compared to the overall period the Instability Index has registered high value during the reform period. The jute and silk have moved to a low Instability Index group during the reform period

from the medium Instability Index during the pre-reform period. The rubber natural has moved to a medium Instability Index during the reform period from a low Instability Index group during the pre-reform period.

Dummy Semi-logarithmic Regression Model for Export of Commercial crops During Pre-reform and Reform Periods

The result of Regression Model by using dummy variable is given below: Semi-logarithmic Regression Equation for Overall Period

$$\ln \square = 5.333 + 0.322 \text{ time} - 1.523 D + 1.975 CD$$

(0.00) (0.078) (0.004) (0.000) R²= 0.84

----- Equation 1

$\ln \square$ = log of Total value of commercial crops export,
D = Dummy Variable

CD = Interaction of dummy and time.

From the Equation-1 the following Equation can be derived

Semi-logarithmic Regression Equation for Pre-reform Period

$$\ln \square = 5.333 + 0.322 \text{ time}$$

----- Equation 2

Semi-logarithmic Regression Equation for Reform Period

$$\ln \square = 3.81 + 1.975 \text{ time}$$

----- Equation 3

Equation 1 explains the relationship between time and log of the total value of commercial crop export. In this Equation, p-values are given in parenthesis. The intercept value, intercept dummy and time dummy are significant at 5 per cent and the time coefficient value is insignificant at 5 per cent level. It has been inferred that the reform has been shifted the intercept downward and slope upward. Since this is a semi-log model antilog of coefficient value directly gave us the percentage change of the total value of commercial crops export as an increase of one year.

Equation 2 shows that intercepts and slope value during the pre-reform period. The antilog of intercept (5.333) is Rs.207 crore, this is the median export value during the pre-reform period.

Equation 3 shows that intercepts and slope value during the reform period. The antilog of intercept (3.81) is Rs.45.15 crore, this is the median export value during the reform period. The antilog of the slope coefficient (1.975) is 7.17 per cent, it has concluded that 7.17 per cent of total export value of commercial crops has increased as an increase of one year during the reform period. The estimation of the semi-log regression model has confirmed that there has been a positive significant change in the export of commercial crop items during the reform period.

Conclusion

It has been observed from the above discussion, reforms accelerated the export performance of all commercial crops during the reform period comparable to the pre-reform and overall study periods. During the reform period, some of the commercial crops viz. natural rubber (12.50), silk (8.76), jute (10.84) and tobacco unmanufactured (6.50) have moved to positive growth rate from a negative growth rate during the pre-reform period and three products were moved from low CGR to high CGR viz. cotton lint (20.92), rubber natural dry (38.40) and textile fibers (20.32) during the reform period. The Instability Index for all the commercial crops has decreased during the reform period, compared to the pre-reform period, except rubber natural dry (3.89) but compared to the overall period the Instability Index has registered a high value during the reform period. The jute and silk

have moved to a low Instability Index group during the reform period from the medium Instability Index during the pre-reform period. The rubber natural has moved to a medium Instability Index during the reform period from a low Instability Index group during the pre-reform period. The estimation of the semi-log regression model has confirmed that there has been a positive significant change in the export of commercial crop items during the reform period.

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Author Details

Dr. V. Loganathan, Assistant Professor, Department of Economics, DDE, Madurai Kamaraj University, Madurai, Tamil Nadu, India, **Email ID:** loganathan.ias8@gmail.com