

## Determinants of Agricultural Exports of India: A Commodity Level Analysis

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### Abstract

The export opportunity allows the agricultural sector to expand productive capacity to the full extent. An attempt is made in the present study to specify and estimate the factors affecting agricultural exports of India at the commodity level. The major exportable crops used in the study are rice, wheat, tea, coffee, sugar, cotton lint and tobacco. The literature surveyed clearly shows that Indian exports are influenced by a number of factors. A double log-linear regression analysis has been carried out to understand the role of different factors in affecting agricultural exports across commodities from 1980-2010. Examining determinants of agricultural exports at commodity level is critical for proper allocation and effective utilisation of resources.

The findings of the study validate the hypothesis that the impact of various factors on agricultural exports may not be the same for all commodities. The export determination models suggest that agricultural exports of India are affected by a number of demand and supply side factors. In a nutshell, the empirical findings reveal the predominance of factors like lagged export, production and world income in determining agricultural exports of India. For rice and wheat rather than production, stock with the government influences export to a large extent. Because of semi government interventions in cereal market, actively for mandatory PDS, exports are not allowed on regular basis for many tradable commodities like wheat, therefore, much depends on demand and supply. The findings of the study are relevant to design public policies in the external sector.

**Keywords:** Agricultural Exports, OLS Regression, Determinants, Trade Liberalisation, WTO.

**Contribution/Originality:** This research paper is one of only few studies that have investigated the determinants of agricultural exports of India at a commodity level. The empirical findings of the study may be used as important inputs for designing agricultural export policies in India. There is fundamental evidence of originality in the work; therefore, its authenticity, credibility and novelty are not in doubt.

## 1. Introduction

Theories on international trade supports that trade plays an important role in the development of a country. Nayyar (1976) examined that international trade leads to development of a country. Balassa (1982) suggested that countries applying outward oriented development strategies had a better performance in terms of exports, economic growth and employment whereas countries with continued inward orientation lead to increasing economic difficulties. Duru and Siyan (2019) argued that exports have potential to boost economic growth. They stressed on the need for diversifications in order to sustain export-led growth strategies. The importance of international trade deals with the proper allocation and efficient use of resources. World Development Reports have also shown that outward-oriented trade policies have been more successful in promoting economic growth compared to inward oriented trade policies. The importance of international trade is also explained at the sectoral level in many studies. In the context of agricultural trade, important literature shows that exports can be of much potential benefit to the rural sector, as it removes the restriction on productive output imposed by the low domestic demand for food. It also provides the economic incentives to establish and improve the infrastructure in the rural areas (Sachdev, 2000). The export opportunity allows the agricultural sector to expand productive capacity to the full extent.

Over the last seven decades of Indian planning and trade policies, the perception about the importance

of external trade in economic development has gone through several changes. During the 1950s, the period of First and Second Five-Year plans, foreign trade in agriculture was considered to be almost irrelevant for economic development in India. During the next two decades, i.e., until the mid-1970s, limited export capacity was seen as a constraint on growth and India followed a moderately-outward-looking economic policy (Bhattacharya, 2004). The external sector was therefore given importance from the early 1980s. India initiated liberalization measures from the mid 1980s but it was only from 1991 that reforms gathered pace. The Uruguay Round Agreements, which came into effect from January, 1995 quickened the process of India's integration with the global economy. Since then, considerable changes have been made in the export-import policy in consonance with the provisions of the WTO. Tariff rates and Non-Tariff Barriers (NTBs) have been reduced for several commodities. Export promotion measures have been initiated through notification of agri-export zones in major states along with a removal of restrictions with respect to licensing and other regulations. Attempts have also been made to reform domestic trade by abolishing and simplifying physical and regulatory measures on private trade under the aegis of price, legislative and institutional measures (Bathla, 2011).

There has been a substantial increase in agricultural exports in the era of economic liberalization. Today India is a major supplier of several agricultural commodities like tea,

coffee, rice, spices, cashew, oil meals, fresh fruits, fresh vegetables, meat and its preparations and marine products to the international market. Indian agricultural export basket has also become diversified. India is observed to have exported about three dozen principal agricultural commodities. India has emerged as a leading producer of agricultural commodities, endowed with rich natural resources and favourable soil and climatic conditions. India has huge potentiality in agricultural exports but overall potentiality has not been exploited. However, in the era of trade liberalization, agricultural export has been increasing but share of agricultural exports in total exports has steadily declined over the years. In addition, agricultural exports are quite volatile and there is large year to year fluctuations in export growth. This has damaged India's image as a stable exporter (Bhalla, 2004).

As far as global competitiveness of agricultural commodities is concerned, there are a number of commodities where India has lost market share substantially. These are mainly cashew kernels, fruits and vegetables, pulses, spices, sugar, tea and tobacco. Loss in market shares reflects reduced global competitiveness, which include both price and non-price factors. The country faces fierce competition from other major players in the field, both the existing and new entrants. Ironically, the major challenge is from within Asia itself where countries like China, Malaysia, Philippines, Thailand, Singapore and Indonesia among others pose a big threat to

Indian agricultural products (Shinoj and Mathur, 2008).

Literature suggests that there is buoyancy in the exports of agricultural products in the post-liberalisation era. Although, there is an increase in the absolute quantum of agricultural exports, there is persistent decline in the percentage share of primary products in total export from about 30 per cent in 1980 to about 10 percent in 2010. This indicates a slow rise in agricultural exports in comparison to national exports. Despite considerable increase in agricultural exports, India is still a marginal player in the world agricultural trade. India's share of agricultural exports in world agricultural exports was about 1.20 percent in 1980. In the post-WTO regime, share of agricultural exports in world agricultural exports increased to 1.70 percent in 2010. In the wake of global slowdown and growing protectionism, agricultural exports of India have also declined. Further, weak global demands have further added volatility to the export basket. These issues pose considerable challenges before the government to take necessary steps to augment agricultural exports. In this context, an examination of determinants of agricultural exports at the commodity level is crucial for designing public policies while dealing with challenges of the external sector.

## 2. Review of Literature

Riedel (1984) emphatically argued that the typical demand function of exports yields biased estimates of the parameters if the supply side variables are not taken into account. Therefore, in the literature, an economic analysis

of export performance entails both demand and supply factors to be considered as determining variables in the export function. The important literature on the subject suggests that agricultural exports in India are influenced by multiple factors which vary across the commodities. Kumar and Mittal (1995) examined factors affecting tea exports and found that tea exports are insensitive to price incentives and to changes in the world demand and decrease with increasing share of domestic consumption. Kumar (2004) analysed export performance of Indian fisheries. World export and exchange rate were found to be positively associated with fishery exports of India. Domestic prices have theoretically consistent sign of coefficient. However, world prices do not play an important role in explaining exports of fisheries products from India. Kumar et al. (2007) examined the determinants of livestock exports. Ratio of production to consumption, ratio of world export to world output, exchange rate and removal of quantitative restrictions have positively affected livestock exports. However, relative prices did not play important role in influencing overall livestock exports.

Kumar and Rai (2007) examined determinants of tomato exports of India. World export and relative prices have positive impact on tomato exports. However, domestic production had a negative impact on tomato exports from the country. In this context, the authors put forth the arguments that increase in domestic production had coincided with the increased international production, causing depressed international prices and hence lower exports from India.

Gulati and Kelly (2001) and Bathla (2011) found that exports of agricultural commodities are determined by a host of factors, varying from commodity to commodity. In the case of wheat and rice, production, stock and government policies matter.

Examining determinants of agricultural exports at commodity level is critical for proper allocation and effective utilisation of resources. The present study aims to examine the factors that explain variations in exports of major agricultural commodities.

### **Objective**

To examine the factors that affect exports of major agricultural commodities in India from 1980-2010.

### **Hypothesis**

The impact of various factors on agricultural exports may not be the same for all commodities.

### **3. Data and Methodology**

Geographically, the investigations were carried out at the all-India level and separately for seven important tradable commodities, viz., rice, wheat, tea, coffee, cotton lint, sugar, tobacco. The choice of these crops was determined by their increasing share in external trade. The analysis covered a time span of three decades from 1980-2010, broadly representing the pre-WTO period from 1980-1995 and post-WTO period from 1995-2010.

Data were collected from secondary sources and converted at 2004-2005 prices. Data on agricultural exports and production were taken from Food and Agricultural Organisation of the United Nations (FAO) trade database. Data on world income/GDP was taken

from World Bank database. Rice and wheat stock data were taken from RBI database on Handbook of Statistics on Indian Economy. The data on domestic and international prices of agricultural commodities were taken from various sources. Domestic wholesale prices have been taken from FAO database. International price data has been taken from World Bank pink sheet database, UNCTAD database and IMF's International Financial Statistics. Real Exchange Rate was calculated from the Report on Currency and Finance, RBI. Wholesale price index for all commodities at 2004-05 prices was extracted from the website of ministry of economic advisor, Government of India.

### 3.1. Specification of the Model

Exports from any country are influenced by both demand and supply factors. A traditional export demand function at the aggregate level is expressed as  $X = f(P, Y)$  where  $X$  is export demand,  $P$  is relative export price and  $Y$  is real income of importing countries. The relative export price is measured as the ratio of home country's export unit value index to a weighted average of competing countries unit value indices, the weights being the relative export shares. The income variable  $Y$  is often represented by world demand or world exports to explain export performance. The export function is generally specified in a log-linear form and estimated applying the ordinary least squares (OLS) technique.

To identify the factors that affect agricultural exports, double log-linear regression analysis was carried out in the study. The agricultural export function was specified as follows:

$$\ln \text{Export} = \beta_0 + \beta_1 \ln \text{Export} (-1) + \beta_2 \ln \text{Production} + \beta_3 \ln \text{WP/DP} + \beta_4 \ln \text{REER} + \beta_5 \ln \text{World Income} + \beta_6 \ln \text{Openness} + \epsilon_i$$

Where,

$\ln \text{Export}$  = Natural logarithm of export of  $i^{\text{th}}$  commodity in thousand tonnes

$\ln \text{Export} (-1)$  = Natural logarithm of export of  $i^{\text{th}}$  commodity in thousand tonnes (one year lagged)

$\ln \text{Production}$  = Natural logarithm of production of  $i^{\text{th}}$  commodity in thousand tonnes (one year lagged)

$\ln \text{WP/DP}$  = Natural logarithm of ratio of world price to domestic price of  $i^{\text{th}}$  commodity in rupees per ton at 2004-05 prices

$\ln \text{REER}$  = Natural logarithm of real effective exchange rate (REER) at 2004-05 prices

$\ln \text{World Income}$  = Natural logarithm of world income in thousand rupees at 2004-05 prices

$\ln \text{Openness}$  = Natural logarithm of percentage of domestic agricultural exports to world agricultural exports (values in thousand rupees at 2004-05 prices)

While explaining factors affecting agricultural exports, alternative equations have been tried, also to avoid the problem of multicollinearity. In case of rice and wheat stocks with the government has been taken into consideration.

### 4. Empirical Results and Discussion

The empirical literature surveyed on export determination model shows that agricultural exports in India are mainly determined by production,



lagged export, relative prices, exchange rate, world export, world income, openness and policy variables like removal of quantitative restrictions. Theoretically, all these variables are expected to have a positive sign. If external price is higher than domestic price i.e., relative price ratio is greater than one and is increasing, it will positively influence the level of exports and hence, bears a positive sign. It also indicates competitiveness of a commodity in the world markets. On the contrary, if external world price is less than the domestic price i.e., the relative price ratio is less than one, then there is no incentive to export and the variable may be insignificant with positive or negative sign (Bathla, 2009). Beside relative price movement, production can also explain exports because with an increase in output more marketable surplus can be utilized for export purposes. Exchange

rate depreciation is expected to increase exports. Economic literature suggests that an increase in the world income also leads to an increase in exports. In addition, sometimes export also depends on its lagged exports. Further, a greater openness of economy through reduction in export barriers is likely to create a positive environment for export growth. The impact of this variable is captured to the positive openness made to world trade, indirectly captured through India's share of agricultural exports in total world agricultural exports. Dummy variable was used to capture differences in agricultural exports during pre and post-WTO periods. However, it was dropped due to errors in estimation.

The determinants of seven major agricultural exports namely rice, wheat, tea, coffee, sugar, cotton and tobacco are provided as follows:

**Table 1: Determinants of Rice Exports**

Outcome Variable: Rice Export		
	Equation 1	Equation 2
Explanatory Variables	Coefficients	Coefficients
Constant	-1.33	-22.20**
Export (-1)	0.59***	0.51***
Govt. Stock (-1)	0.75**	0.67**
WP/DP	-.10	0.13
REER	-.58	—
World Income	—	0.69*
R-squared	0.84	0.86
D-W	2.19	2.20
Note: ***, ** and * denote 1, 5 and 10 percent level of significance respectively.		

Table 1 shows that the explanatory variables in the equation 1 and equation 2 could explain 84 percent and 86 percent respectively of the

total variation in the exports of rice. The coefficients for most of variables indicate that different factors influence the exports of rice differently.

The export function (equation 1) shows rice exports to be positively influenced by lagged export and lagged stock. These variables bear the expected signs and are statistically significant. Ratio of world price to domestic price and real exchange rate have negative signs, however these are statistically insignificant. Therefore, it could be concluded that real exchange rate and ratio of world price to domestic price have not played any significant role in the exports of rice from India during

1980 to 2010. In equation 2, instead of REER world income was added in the model because of the problem of multicollinearity. The coefficient of the world income is statistically significant. It shows 1 percent increase in world income leads to 0.69 percent increase in rice exports. The coefficients of lagged export and lagged stock are also positive and significant. Ratio of world price to domestic price has positive sign, however insignificant.

**Table 2: Determinants of Wheat Exports**

Outcome Variable: Wheat Export		
	Equation 1	Equation 2
Explanatory Variables	Coefficients	Coefficients
Constant	-10.53	-90.48
Export (-1)	0.37**	.35*
Govt. Stock (-1)	2.48**	2.63**
WP/DP	1.70	3.53
REER	-2.21	—
World Income	—	2.42
R-squared	0.27	0.28
D-W	2.23	2.19
Note: ** and * denote 5 and 10 percent level of significance respectively.		

In table 2, estimates of equation 1 shows that like rice lagged export and lagged stock are positively and significantly associated with wheat exports. A 1 percent increase in lagged stock leads to 2.48 percent increase in wheat export. Ratio of world price to domestic price does not play any role in affecting wheat export, as the coefficient is insignificant. Because, domestic price of wheat is higher than the world price so increases in world prices do not play important role in increasing wheat export of

India. A negative sign of coefficient was expected; however, it is positive but insignificant. Real exchange rate is negative but insignificant. In equation 2 of the model, real exchange rate has been dropped and world income was added, because real exchange rate and world income are highly correlated to each other. The coefficient of world income is positive but insignificant. Lagged export and lagged stock have major role in affecting wheat export of India.

**Table 3: Determinants of Cotton Lint Exports**

Outcome Variable: Cotton Lint Export			
	Equation 1	Equation 2	Equation 3
Explanatory Variables	Coefficients	Coefficients	Coefficients
Constant	-20.49***	-25.19**	-24.20***
Export (-1)	0.32*	0.33*	0.26
Production	3.02***	2.17***	3.45***
WP/DP	.83*	—	—
REER	—	2.54*	—
Openness (share)	—	—	1.90**
R-squared	0.51	0.51	0.56
D-W	2.15	2.02	2.09
Note: ***, ** and * denote 1, 5 and 10 percent level of significance respectively.			

From table 3 of equation 1 it is obvious that cotton lint export is determined by lagged export, production and ratio of world price to domestic price. All the variables have positive and significant signs of coefficients as expected. In equation 2, real exchange rate was added, which is also positive and significant. It shows that 1 percent increase in exchange rate leads to 2.54 percent increase in cotton lint exports of India. Therefore, exchange rate adjustments have major impact on cotton lint export. In equation 3,

openness was included in the model to see the integration of domestic economy into the world economy. The value of the coefficient is positive and statistically significant. One percent increase in openness leads to 1.90 percent increase in cotton export. This shows economic liberalization and post-WTO agreements have positively affected cotton exports of India. The included explanatory variables could explain 51 percent to 56 percent of the total variation in cotton lint exports.

**Table 4: Determinants of Sugar Exports**

Outcome Variable: Sugar Export			
	Equation 1	Equation 2	Equation 3
Explanatory Variables	Coefficients	Coefficients	Coefficients
Constant	-25.28	-25.39**	0.78
Export (-1)	0.64***	0.66***	0.68***
Production	2.12**	2.83**	2.37*
WP/DP	0.80	0.40	0.60



REER	1.70	—	—
Openness (share)	—	1.57	—
World Income	—	—	-.75
R-squared	0.47	0.49	0.46
D-W	1.71	1.70	1.72
Note: ***, ** and * denote 1, 5 and 10 percent level of significance respectively.			

Table 4 shows that sugar export mainly depends on lagged export and production as it is visible in the estimates of the equations. Both the variables are positive and statistically significant. Ratio of world price to domestic price is insignificant in all the three equations. A negative or insignificant value of WP/DP was expected, as is the case, because domestic wholesale prices have been higher than the international prices. Therefore, international prices of sugar

do not influence Indian sugar exports. Bathla (2009) analyzed that wholesale price of sugar was higher than the world price from 1980/81 to 1988/89 and then from 1997/98 to 2002-03. Exchange rate and openness also do not seem to affect exports of sugar. World income also does not play any role in influencing sugar export. The value of the coefficient is negative however insignificant. The value of the R-Squared varies between 46 and 49 percent.

**Table 5: Determinants of Tobacco Exports**

Outcome Variable: Tobacco Export			
	Equation 1	Equation 2	Equation 3
Explanatory Variables	Coefficients	Coefficients	Coefficients
Constant	-2.38	-.70	-31.53***
Export (-1)	0.42***	0.45***	0.26
Production	0.65*	0.64**	0.68***
WP/DP	-.39***	-.51***	—
REER	0.36	—	1.79***
Openness (share)	—	0.28	—
World Income	—	—	0.80***
R-squared	0.72	0.74	0.75
D-W	2.52	2.59	2.30
Note: ***, ** and * denote 1, 5 and 10 percent level of significance respectively.			

Results for tobacco are presented in table 5. Equation 1 of the model shows that export of tobacco is determined primarily by lagged export and production. The values of the coefficients are 0.42 and 0.65 respectively. The coefficient of ratio

of world price to domestic price is negative. This shows that prices do not play important role in increasing tobacco exports. The possible reason may be that the products like tobacco are price insensitive and demand for such products are inelastic in nature

with respect to price. The coefficient of real exchange rate has positive sign but insignificant. The explanatory variables explain 47 percent of variations in tobacco exports.

In equation 2 also relative prices negatively affect domestic tobacco exports. Openness was included in the model. The sign of the coefficient is positive but insignificant. The dependent variables together could explain 74 percent of variation of total tobacco export. In equation 3, real exchange rate positively and significantly affects tobacco exports. It

shows 1 percent increase in exchange rate leads to 1.79 percent increase in tobacco exports. Production is an important determinant with expected positive sign of coefficient. World income was included in the model. It shows that Indian tobacco export is very much guided by changes in the world income. The value of the coefficient of world income is positive and significant at 1 percent level. 1 percent increase in world income leads to 0.80 percent increase in Indian tobacco export. The explanatory variables together could explain 75 percent of total variations in tobacco exports.

**Table 6: Determinants of Tea Exports**

Outcome Variable: Tea Export		
	Equation 1	Equation 2
Explanatory Variables	Coefficients	Coefficients
Constant	-.22	0.26
Export (-1)	0.35**	0.36**
Production	0.51*	—
Openness (share)	0.23**	—
WP/DP	—	0.25
REER	—	0.27**
R-squared	0.39	0.38
D-W	2.08	1.99
Note: ** and * denote 5 and 10 percent level of significance respectively.		

From the statistical evidence furnished in table 4.6 of equation 1, it is quite clear that Indian tea exports are influenced by lagged export, production and openness. A 1 percent increase in production leads to 0.51 percent increase in tea exports. Tea export is positively influenced by openness. The value of the coefficient of openness is 0.23. It is positive and significant at 5 percent level. Given a relatively higher world price of tea than the domestic price, one would expect export to

positively respond to price incentives. In equation 2, the analysis reveals elasticity estimate of exports to relative price is positive, however insignificant. Tea export also depends on its lag. The value of the coefficient of lagged export is 0.36, which is significant at 5 percent level. Real exchange rate is another determinant of tea exports. Therefore, exchange rate adjustments have important role to play in determining tea exports. A 1 percent increase in exchange rate leads to 0.27 percent

increase in tea exports of India. The included explanatory variables could

explain around 39 percent of the total variation in the exports tea.

**Table 7: Determinants of Coffee Exports**

Outcome Variable: Coffee Export			
	Equation 1	Equation 2	Equation 3
Explanatory Variables	Coefficients	Coefficients	Coefficients
Constant	1.36	2.12	-8.67
Export (-1)	0.38***	0.30***	—
Production	0.73***	0.65***	0.66***
WP/DP	0.11	—	0.12
REER	-0.53***	-0.50**	-0.11
Openness (share)	—	0.07	—
World Income	—	—	0.37**
R-squared	0.91	0.90	0.88
D-W	1.97	1.74	1.41
Note: *** and ** denote 1 and 5 percent level of significance respectively.			

Table 7 shows estimates of coffee exports function. Three equations have been specified and estimated. From the estimates of equation 1 it is clear that coffee exports depend on lagged export, production and exchange rate adjustments. A 1 percent increase in production leads to 0.73 percent increase in coffee exports. The sign of coefficient of relative price is positive but insignificant. It shows that relative prices have not played important role in influencing coffee exports. The real exchange rate did not have theoretically correct signs. It shows that 1 percent increase in exchange rate leads to 0.53 percent fall in coffee exports. The possible reasons may be that exchange rate anticipation is quite common. Therefore, the export decisions also depend on possibilities of exchange rate changes in near future. Secondly, other countries in the world have also devalued their currencies frequently in the last three decades, thirdly, frequent occurrence of financial and economic

crisis in the world over. Fourthly, tea has also emerged as an important substitute to coffee and changes in the prices of substitute products have important implications on export decisions. Fifthly, till 1987, India did not import any coffee, however from 1988 onwards India has been continuously importing coffee and it has gone up tremendously in recent years. In this context, Bhalla (2004) found that exchange rate adjustment does not necessarily lead to higher exports. In equation 2, openness is included which is positive however, it does not play important role in influencing coffee exports. The value of the coefficient of world income is positive and significant in equation 3. It shows that a 1 percent increase in world income leads to 0.37 percent increase in domestic exports of coffee. R-squared is quite robust. The included explanatory variables could explain 88 to 91 percent of the total variation in the exports of coffee.

## 5. Conclusions

An attempt is made in the present study to specify and estimate the factors affecting agricultural exports at a disaggregated level from India. The literature surveyed clearly shows that Indian exports are influenced by a number of factors. A double log-linear regression analysis has been carried out to understand the role of different factors from 1980 to 2010. The major exportable crops used in the model are rice, wheat, tea, coffee, sugar, cotton lint and tobacco. For each commodity, various equations are specified to examine their influence on exports. Alternative equations have been tried in the model mainly to avoid estimation error and multicollinearity.

The estimated equations for rice shows that lagged export lagged stock and world income played a predominant role. In the case of wheat, as India does not export much of wheat and there is wide year to year fluctuations, it is mainly affected by lagged export and lagged stock with the government. Like wheat, sugar export is also influenced mainly by lagged export and production. The estimates of cotton lint reveal that it is affected by a number of factors like lagged export, production, relative prices, openness and exchange rate. However, world income does not play important role in affecting cotton exports. Factors like, lagged export, production, world income and exchange rate affect tobacco export positively and significantly. Tea export is influenced by lagged export, production, openness and exchange rate. In case of coffee, lagged export, production and world income play the dominant role in affecting coffee exports of India

and the coefficients have theoretically consistent signs.

Hence, the findings of the study validate the hypotheses that the impact of various factors on agricultural exports may not be the same for all commodities. In a nutshell, the empirical findings reveal the predominance of factors like lagged export, production and world income in determining agricultural exports of India. For rice and wheat rather than production, stock with the government influences export to a large extent. Because of semi government interventions in cereal market, actively for mandatory PDS, exports are not allowed on regular basis for many tradeable commodities like wheat, therefore, much depends on demand and supply.

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**Annexure A.1: Detailed Data Description and Sources**

Variables	Brief Description of Data	Data Sources
Agricultural Exports (All Commodities)	To estimate the determinants of agricultural exports, export quantities taken in thousand tonnes.	Food and Agricultural Organisation of the United Nations (FAO) trade database
Agricultural Production	Agricultural production taken in thousand tonnes.	FAO Trade Database
Value of Agricultural Production	Value of agricultural production in thousand rupees	National Accounts Statistics (NAS), India
Wholesale Price Index	Ministry of Economic Advisor, Government of India.	
Government Stock	Rice and Wheat stock in thousand tonnes	Handbook of Statistics on Indian Economy, RBI
World Income/GDP	Converted in thousand rupees	World Bank database
Openness	India's share of agricultural exports in total world agricultural exports (values) is taken as a proxy of openness	
Real Exchange Rate	Exchange rate is given in Rs/US \$ in nominal terms and the series is extracted from the Report on Currency and Finance, RBI. Nominal exchange rate is converted in real exchange rate using 36-currency basket REER index prepared by RBI by the method of deflator at 2004-05 base.	
Domestic Prices	Domestic wholesale prices	FAO
Unit Value Index	As a proxy of domestic prices for Tea, calculated by dividing production value to production quantity in rupees per ton.	
International Prices	Price unit is in rupees per ton at 2004-05 prices.	
Rice, Wheat, Tobacco Unmanufactured	United Nations Conference on Trade and Development (UNCTAD) Statistics.	
Tea	International Financial statistics, IMF Data.	
Coffee, Cotton, Sugar	World Bank, The Pink Sheet.	

**Note:** All the variables are converted at 2004-05 prices.

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