Classroom Experiment for finding a suitable Forecasting Model for Gross Value of Output from Agriculture & Allied Sector at Current Prices

 # 1. N K Tudu, 2. Megha Tomar, 3. S Sahoo
@ Corresponding Author

Abstract

In fast-developing Indian economy, the necessity for a reliable and comprehensive forecasting of the data pertaining to the estimation of the Gross Value of Output (GVO) from agriculture and allied sector needs no emphasis. Demographically, this sector is the broadest economic sector and plays a significant role in the overall socio-economic fabric of the country. This paper tries to identify which forecasting model is the best fit for the forecast of Gross Value of Output of Agriculture & Allied Activities at Current Prices at all-India Level using R-software and MS-Excel.The current study tries to fit different forecasting models on the time series data on GVO of agriculture and allied sectors. The analysis of results showed that best forecast is given by ARIMA Model using Transfer Function.

Key words: -GDP, ARIMA, Log-linear, MAFE, GVO

1. Deputy Director General, DPD, MoSPI, 2. Young Professional, Dept of Biotechnology, 3. Statistical Adviser, Dept of Biotechnology.
@ S Sahoo. All the correspondence can be made at sankar7@rediffmail.com

Introduction

Forecasting various economic indicators has been an old age practice for planners and also the mandate of various institutions in India. Recently, forecasted economic variables became a debated topic as the actual data is being received and the same is being revised. While, RBI publishes forecasting values of various financial indicators, the Ministry of Statistics & Programme Implementation (MoSPI) publishes forecasting values of various macro-economic indicators such as Gross Domestic Product (GDP), Index of Industrial Production (IIP), Consumer Price Index (CPI) and others. Presently none of the forecasting model can give the exact future value, but major revisions in forecasted value and the revised value have been a contagious issue and have bearing on the credibility of the institutional frame-work. Further, if the economic variables are market sensitive, then any error in forecasted values has a bearing on producers and consumers. Agriculture & allied sector is also one such sensitive sector. Further, agriculture and allied sector not only contributes considerably to the GDP of India but also a crucial part of both secondary and tertiary sector of Indian economy. Agriculture and allied sector provide the supply of raw material to the industries of both secondary and tertiary sector. Agriculture plays an important role in proving food security to the employment generation. This sector generated 17.5% of the national GDP at current prices in 2015–16 (Press Release, 31.01.2017).Demographically, agriculture and allied sectors is the broadest economic sector and plays a significant role in the overall socio-economic fabric of the country. It accounted for 17.4 % of the GDP at current prices in 2014-15.

Table-1: Share of Agriculture &Allied Sectors in Overall GDP at current price[$]

Year	Over- all GDP (Rs.in Cr)	GDP-Agri& Allied (Rs.in Cr)	% Share of Agriculture &Allied
2011-12	8106656	1501816	18.5
2012-13	9210023	1680797	18.2
2013-14	10380813	1902452	18.3
2014-15	11472409	1995251	17.4

$ Press note on first revised estimates of national income, consumption expenditure, saving and capital formation 2014-15.

Additionally, for India's agricultural industry to thrive sustainably, price stability is essential. It helps farmers to make a living, encourages investment and productivity, keeps input costs under control, improves market access, and helps ensure global food security. Farmers can plan for future investments, enhance agricultural practices, and maintain their livelihoods when prices are stable as they might know the amount they are going to receive for their produce in a fair and predictable manner. Therefore, reliable forecasting of macro-economic indicators pertaining to this sector has been long sought by planners, suppliers, and consumers.

This paper applied different popular forecasting models and attempted to identify which forecasting model is the best fit using Mean Absolute-Percent Forecasting Error (MAFE).For this task, the Gross Value of Output of Agriculture & Allied Activities (Crop Sector) at Current Prices at all-India Level has been chosen for fitting different forecasting modelson the time series data on GVO of agriculture and allied sectors published by Ministry of Statistics and Programme Implementation (MoSPI). As the main objective is to find the best forecasting model, therefore, only limited past time-series data have been taken into consideration.

Literature Review

In India, various institutions and agencies are involved in forecasting production of various crops. Unfortunately, the detailed literatures are not publicly documented by any of the above agencies (except FAO where the literature is too technical). The models used by various agencies for estimation of crop production/GVO are given in Table-2.

Table-2: Models used by various Agencies for Crop-Estimation

Sr. No	Name of the institution	Model Name / Methods	Remark
1	Food and Agriculture Organization (FAO	CASIMO Model	Crop Production
2	Mahalanobis Crop Forecasting Centre	Remote Sensing Data and yield from crop cutting experiments	Crop Production
3	Institute of Economic Growth	FASAL Scheme/ ARIMA Model	Crop Production
4	Directorate of Economics and Statistics	Land Use Statistics and yield from crop cutting experiments	Crop Production
5	NCAER	Trend growth / ARIMA and Harmonic Analysis	Crop Production / Price Forecasting/ India stand-alone Casimo Model
6	Agriwatch	Combination of Remote, on field and telephonic as per client requirements	Crop Production / Price Forecasting

Furthermore, it has been observed that the Agriculture & Allied Sector consists of four subsectors namely, (a) Crop sector, (b) Livestock, (c) Forestry and (d) Fisheries.

The economic activities included in crop sector are growing of non-perennial and perennial crops and plant propagation. Apart from growing of field crops, fruits, nuts, seeds and vegetables, plantations crops, it also includes ancillary activities of cultivators such as transportation of own produce to primary markets and operation of irrigation system which comprises supply of water through various Government channels to the agriculturists. The entire crop sector is grouped as: (1) Cereals, (2) Pulses, (3) Oil seeds, (4) Sugar crops, (5) Fibers (6) Drugs and Narcotics, (7) Condiments and Spices (8) Fruits and Vegetables (9) Other crops (10) By-products and (11) Kitchen Garden. It was observed that the groups are further divided as “crops” or “crops are clubbed as group-miscellaneous crops” and in total there are 111 subgroups. The data on value of the output was available for 111 sub-groups of the crops.

In Livestock sector, it was observed that some of items are clubbed and data was available for 7 groups / sub-groups of the output variable of livestock such as 7 broad groups viz., (i) milk, (ii) meat, (iii) eggs, (iv) wool, (v) dung, (vi) silk worm cocoons & honey, and (vii) increment in livestock.

The forest products are classified into two broad groups viz., (a) major products comprising industrial wood (timber, round wood, match and pulpwood) and fuel wood (firewood and charcoal wood) and (b) Non-Timber Forest Products (NTFP). However, data was available for 3 groups of the output variable of forestry sector such as Industrial Wood, Fuel Wood and Non-Timber Forest Product.

In Fisheries sector, it was observed data was available for 2 groups of the output variable such as Inland Fish and Marine fish.

Source of Data

The current study majorly uses the data published by the Central Statistics Office (CSO), MoSPI, Government of India (GoI). CSO introduced the new series of

National Accounts Statistics with base year 2011-12, in place of the previous series with base year 2004-05 on January 30, 2015 through a Press Release, giving the New series Estimates of National Income, Consumption Expenditure, Saving and Capital Formation for the years 2011-12 to 2013-14. Subsequent to the release of the new series of national accounts with base year 2011-12, the Central Statistics Office brought out a publication on changes in methodology and data Sources in the new Series of National Accounts. State wise and item-wise time series estimates of value of output from agriculture and allied sectors with base year 2004-05 and 2011-12 published by CSO in 2015 have been used wherein data from 2004 to 2011 have been used for forecasting and estimation. For the present study, the data have been taken only till 2011 as the authors wanted to test the historical data to identify the best forecasting method for the estimation of GVO from agriculture and allied sector at current prices. The data used for the analysis is given in Annexure-1.

Tools & Methodology

To identify which forecasting model is the best fit, the minimum values of Mean Absolute-Percent Forecasting Error (MAFE) were taken. The MAFE is given as follows.

MAFE= {|Forecasted Values- Actual Value| / Actual Value } * 100

The list of tools & Methodology used I the present study has been depicted below.

Tble-5: List of Tools & Methodology used for various activities

Sr. No	Activity / Description	Methodology	Tools
1	Characteristics of Input Variable	Detailed review of literature on calculation of GVO from Agriculture and allied sectors.	List of the publication as given in reference
2	Models selected for Forecasting	Detailed review of literature on forecasting using different models.	List of the publication as given in reference
3	Fitting different models on State-wise Crop-wise time series data of Value of Output	Fitting different models namely, (a) Linear Model, (b) Log Linear Model, (c) ARIMA Model after Logarithmic Transformation and (d) ARIMA Model using Transfer Function	R- Software / MS- Excel

Characteristics of Input Variable

For any successful implementation of different forecasting models, the analysis and in-depth study of input variable is a pre-requisite. Usually, the lab-experiments and academic text books contain the curated input variables and pretend to showcase the power of the forecasting models. However, in actual experiments and fields, observed variables need lot of pre-processing and data cleaning before fitting any forecasting models. These pre-processing and data cleaning activities rely heavily on nature of the variable, its distribution, classification, extent of missing values and others. One of the important steps is to identity the unit level data for which the forecasting models are applied with the constraints that the finer the unit level data, the better the projection.As the literature review suggests that, agriculture and allied sector consists of four subsectors namely, (a) Crop sector, (b) Livestock, (c) Forestry and (d) Fisheries. And these subsectors are further categorized into groups and sub-groups. Hence, these groups andsub-groups will act as the unit level data for which the forecasting models will be applied.

In order to get insights from raw data, the data was first curated by organizing and bringing together relevant information into structured form for application of different models. From verification, it was observed that there are (i) Case of Inconsistency/Non-availability of Data, (ii) Case of Structural Breaks and (iii) Case of Crops where value is reported 'Zero' because of rounding estimate, (iv) Case of Outliers. The details of the cases are depicted bellow.

i. Case of Inconsistency/Non-availability of Data

In the 2011-12 series (New base year), estimates of output for crops such as Cowpea, Rajma, Wal, Batna, and Choula (earlier covered under 'Other Pulses'), Beans, Bitter gourd, Bottle guard, Capsicum, Carrot, Cucumber, Muskmelon, Radish, Parwal, Pumpkin and Watermelon (earlier covered under 'Other Vegetables'), Aonla, Ber, Custard Apple, Kiwi, Passion Fruit, Peach, Plum, Pomegranate and Strawberry (earlier covered under 'Other Fruits') are compiled separately. As a result, the data on "other pulses", "other vegetables" and "other fruits" does not contain value of output of above said items from 2011-12 onwards.

ii. Case of Structural Breaks

As stated earlier, in the 2011-12 series (New base year), estimates of output for crops such as Cowpea, Rajma, Wal, Batna, and Choula (earlier covered under 'Other Pulses'), Beans, Bitter gourd, Bottle guard, Capsicum, Carrot, Cucumber, Muskmelon, Radish, Parwal, Pumpkin and Watermelon (earlier covered under 'Other Vegetables'), Aonla, Ber, Custard Apple, Kiwi, Passion Fruit, Peach, Plum, Pomegranate and Strawberry (earlier covered under 'Other Fruits') are compiled separately. As a result, the data on above said items are available from 2011-12 onwards only.

Table-3: Crops with Structural Breaks

Sr. No.	Group	Name of the Crops	Remark
1	Other Pulses	Cowpea, Rajma, Wal, Batna, and Choula	There is structural break in 2011-12
2	Other Vegetables	Beans, Bitter gourd, Bottle guard, Capsicum, Carrot, Cucumber, Muskmelon, Radish, Parwal, Pumpkin and Watermelon	
3	Other Fruits	Aonla, Ber, Custard Apple, Kiwi, Passion Fruit, Peach, Plum, Pomegranate and Strawberry	

iii. Case of Crops where value is reported 'Zero' because of rounding estimate

As per the published document, the value of the output is given in rupees lakhs. As a result, some items are shown having value "zero" due to the rounding. It is also observed that in some cases the total does not add due to the rounding problem.

Following table summarizes the items having some value but reported as "zero" due to rounding problem.

Table-4: Crops rounded off to Zero (0)

Sr. No.	Group	Name of the Crops	Remark
1	Other Pulses	Cowpea, Rajma, Wal, Batna, and Choula	Data available from 2011-12 onwards
2	Other Vegetables	Beans, Bitter gourd, Bottle guard, Capsicum, Carrot, Cucumber, Muskmelon, Radish, Parwal, Pumpkin and Watermelon	
3	Other Fruits	Aonla, Ber, Custard Apple, Kiwi, Passion Fruit, Peach, Plum, Pomegranate and Strawberry	

iv. Case of Outliers

In some of the crops, we observed that the value of output has shown very high/low value as compared to the time series data of the item. Initially, it appeared to be an outlier. However, as the production figure reported by the concerned agency also showed the similar trend, therefore, we ignored the case of outlier. Also, here we

have considered those values to be an outlier which are significantly close to zero and the foresaid values are rounded off to zero.

Models selected for Forecasting

In this paper, we have proposed to study (A) Linear Model, (B) Log Linear Model, (C) ARIMA Model using Logarithmic Transformation and (D) ARIMA Model using Transformation function (Residual & AIC criteria). A brief description of the models is given below:

(A) Linear Model

Given a (random) sample of size k, the relation between the observations Yi and the independent variables Xij is formulated as

$\boldsymbol{Y = \beta_0 + \beta_1 X_{1k} + \beta_2 X_{2k} + \cdots + \beta_k X_{nk}}$; k=1, 2…n

The "linear" part of the above designation relates to the appearance of the regression coefficients, β_j in a linear way in the above relationship.

Software used: -Both R-Software and MS-Excel have been used for estimating / fitting the proposed models.

R-Code for Fitting Linear Model

$$lm1 < -lm(z \sim yr)$$

(B) Log-linear model

The Log-linear model is given as follows:

$$\boldsymbol{logY_t = \alpha + \beta X_t + \varepsilon_t}$$

Where

$\mathbf{Y_t}$ denotes the **Gross Value Output (GVO)** corresponding to all 35 states respectively.

$\mathbf{X_t}$ denotes the **time periods** (in years) ranging from **2004-2010**.

αandβ_t denotes the parameters to be estimated and εis the error term having **0 mean** and **variance** σ_t^2

Software used:-MS-Excel have been used for estimating / fitting the proposed models. **Function used in Excel :GROWTH** (GVO for time t, time t, time period t for which predicted values are sought, FALSE). "Here, we are using constant FALSE so that b in $y=bm^x$ may be treated as 1, i.e., the equation is treated as $y = m^x$."

(C)ARIMA Model with Logarithmic Transformation

Autoregressive integrated moving average (ARIMA) model is a generalization of an autoregressive moving average (ARMA) model. The Box-Jenkins methodology gives us a way of fitting an ARIMA (p,d,q), where the parameter such as p is the order of autoregressive model, d is the degree of differencing, and q is the order of moving-average.

After identifying**p,d,q,** the model is given as following form:

$$X_t = \alpha_1 X_{t-1} + \alpha_2 X_{t-2} + \cdots + \alpha_{1p} X_{t-p} + \epsilon_t + \beta_1 \varepsilon_{t-1} + \beta_2 \varepsilon_{t-2} + \cdots + \beta_q \varepsilon_{t-q}$$

The parameters, the alphas and betas are estimated as follows:

- least squares estimation (which is equivalent to maximum likelihood evaluation if the error terms can beassumed to be normally distributed)
- Method of moments, where we equate population autocorrelations $\rho_k$withsample autocorrelations r_k.

After studying the trend, the initial values were transferred to log values. Then the ARIMA Model was selected using ACF shape as follows.

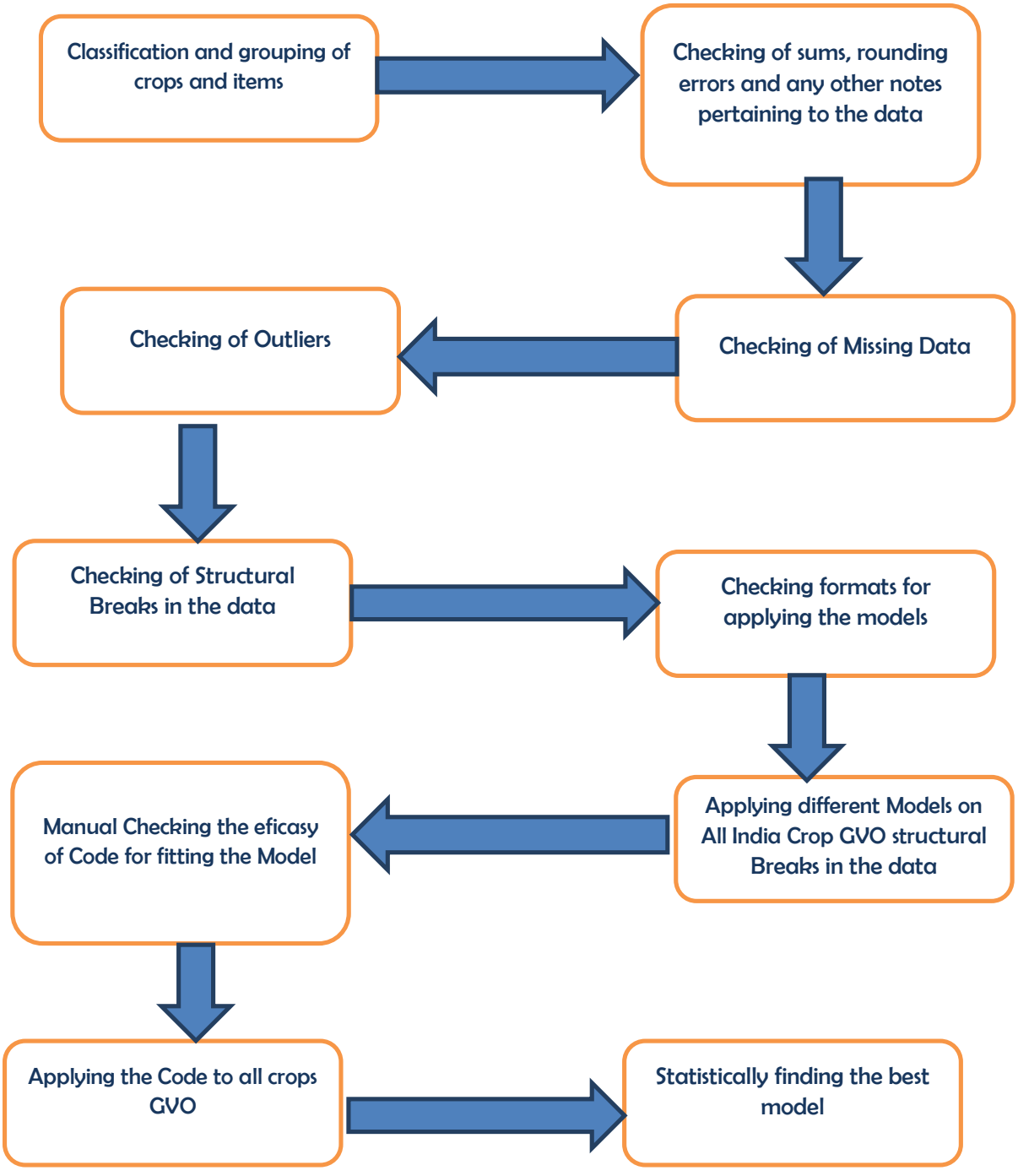
Table-6: Selection of ARIMA Model using the shape of ACF

Sl No	SHAPE	INDICATED MODEL
1	Exponential, decaying to zero	Autoregressive model. Use the partial autocorrelation plot to identify the order of the autoregressive model.
2	Alternating positive and negative, decaying to zero	Autoregressive model. Use the partial autocorrelation plot to help identify the order.
3	One or more spikes, rest are essentially zero	Moving average model, order identified by where plot becomes zero.
4	Decay, starting after a few lags	Mixed autoregressive and moving average model.
5	All zero or close to zero	Data is essentially random.
6	High values at fixed intervals	Include seasonal autoregressive term.
7	No decay to zero	Series is not stationary.

(D)ARIMA with Transfer Function

Firstly, we calculated the fitted values for GVO at Current prices for all the years along with the years whose forecast has to be calculated using GROWTH function in Excel.Then the Fitted Values are subtracted from the Actual Values to obtain the Residuals.ARIMA Model is fitted on the Residuals using ARIMA Function in R & forecast was calculated for the same.This Forecast was further added to the Fitted Values to obtain the corresponding Forecast of the GVO.

Graphical sketch of Fitting Models



Analysis and Findings

After curation of data inconsistency, outliers and others, thepreviously stated models were applied to the cured data sets. The details of the parameters estimated by different forecasting models have been given in the Annexures. The forecasted values for FY-2011-12 and FY-2012-13 for different forecasting models are summarized in Table-7 and Table-8.

Table-7:Forecasted Value of GVO of Agriculture & Allied Sectors at Current Prices (ALL India) for the year 2011-12

Sl No	Name of the Model	Forecasted Values	NAS-2014 Values	MAFE
1	Linear	1709949.676	1891926	9.62
2	Log linear	1831486.635	1891926	3.19
3	ARIMA with Log Transformation	1993046.490	1891926	5.34
4	ARIMA with Transfer Function	1878510.331	1891926	0.71

Table-8Forecasted Value of GVO of Agriculture & Allied Sectors at Current Prices (ALL India) for the year 2012-13

Sr. No.	Name of the Model	Forecasted Values	NAS-2014 Values	MAFE
1	Linear	1857070.303	2097466	11.46
2	Log linear	2091304.764	2097466	0.29
3	ARIMA with Log Transformation	2413743.420	2097466	15.08
4	ARIMA with Transfer Function	2087588.765	2097466	0.47

Conclusion

Different Models such as, Linear, Log-Linear & ARIMA Models have been fitted on GVO of Agriculture and Allied Sector at current prices using R. Further, the AIC's was calculated for different values of p & q and the best ARIMA model having the minimum AIC has been chosen on the basis of analysis of results. It was observed that in both the years the forecasting error was less than 1%. In the case of Log linear forecasting model, the error for the year 2011-12 was more than 3% and its error was fluctuating. Similarly, the forecasting error of the ARIMA with Log Transformation is highly fluctuating for both the years. Considering the MAFE for

both years and consistency of the forecasting model, it can be concluded that the best forecast is given by ARIMA with Transfer function then by Log-Linear and the least efficient forecast is given by Linear Model.

Recommendations

- The policymakers, economists, and analysts can use the ARIMA with transfer function model for forecasting GVO (subject to limitations of the forecasting method)which may help them in assessment of the economic activity, monitor the growth of different sectors, identify trends, and evaluate the overall performance of a sector in economy in advance.
- Planners may have better anticipation about price stability of commodity or item belonging to agriculture and allied sector and can plan in advance to improve agricultural practices and sustain the livelihoods of the farmers.
- The Model can be replicated for forecasting Crop production which in turn can help in taking precautionary and sustainable measures and will help in strengthening the schemes such as PM Fasal Bima Yojana (PMFBY), Weather Based Crop Insurance Scheme (WBCIS), etc (For example, in case of overproduction, procurement of these commodities can be done by government agencies to overcome the issue of distress selling and shortage of agriculture produce).

Limitations

- All the limitations of any methodology used for forecasting is applicable to this paper.
- Due to methodological complexities and non-availability of data,the structural break in the ARIMA Model cannot be considered.

Data Availability

The analyzed codes generated in the current study are available with the corresponding author on reasonable request.

Conflicts of Interest

The authors declare that there are no conflicting interests.

Acknowledgement

The authors would like to acknowledge, Ms. Himani Mehta, Ms. Jyoti Nahata and Mr. Pramod Kumar for their time and efforts in doing the literature review and data analysis.

References

- Central Statistical Office, 2015, *GVO & GVA for the years 2013-1, National Accounts Statistics*, M/o Statistics & PI, Government of India
- Central Statistical Office, 2015. *Changes in Methodology and Data Sources in the New Series of National Accounts (Base Year 2011-12), M/o Statistics & PI,* Government of India.
- Horticulture Statistics Division, Government of India, 2015. Horticulture at a Glance. Oxford University Press.
- Press Releases. M/o Statistics & PI, Government of India. https://www.mospi.gov.in/sites/default/files/press_release/nad_PR_31jan17.pdf

Annexure-1

Item-wise All India Data

Sr.No.	Crops	2004	2005	2006	2007	2008	2009	2010	2011
1	Paddy	7316191.0	8113825.0	8809587.0	10832351.0	13251091.0	13684798.0	15229847.0	17059496.0
2	Wheat	4778793.0	5369331.0	6900741.0	8206268.0	8926492.0	9207837.0	10275866.0	11806819.0
3	Jowar	454661.0	499844.0	516561.0	749574.0	651037.0	685183.0	1041982.0	980656.5
4	Bajra	441611.0	443898.0	561918.0	634414.0	712805.0	654130.0	949313.0	993963.9
5	Barley	71158.0	86092.0	97705.0	120403.0	143476.0	124498.0	185173.0	190139.1
6	Maize	763580.0	874288.0	949507.0	1293468.0	1505197.0	1482370.0	2106321.0	2353929.0
7	Ragi	117352.0	121547.0	86028.0	134354.0	132132.0	164703.0	204159.0	201465.2
8	Small Millets	23869.0	22385.0	22885.0	34759.0	30558.0	26548.0	36611.0	41345.1
9	Other Cereals	9360.0	6445.0	8224.0	4306.0	5976.0	18316.0	16747.0	8124.0
10	Gram	797015.0	988950.0	1339086.0	1365514.0	1622084.0	1697865.0	1834772.0	2178137.0
11	Arhar	395703.0	479509.0	500132.0	764907.0	711206.0	954283.0	1020372.0	897623.3
12	Urd	204109.0	270141.0	390097.0	362582.0	319631.0	474136.0	679561.0	639919.3
13	Moong	182864.0	232733.0	296021.0	327745.0	285630.0	299793.0	743639.0	598691.7
14	Masoor	182000.0	185672.0	197716.0	217557.0	336242.0	362992.0	309038.0	358239.9
15	Horsegram	22023.0	27304.0	29652.0	29897.0	28207.0	51220.0	46055.0	39485.4
16	Moth	29613.0	37047.0	56549.0	78329.0	66507.0	30234.0	30088.0	98563.6
17	Lakh/Khesari	28056.0	36602.0	45048.0	43261.0	57846.0	62816.0	70055.0	71831.1
18	Peas/Chawali	120853.0	127052.0	108777.0	109484.0	121299.0	126761.0	136565.0	176854.4
19	Other Pulses	62363.0	68141.0	91334.0	98032.0	124628.0	177948.0	201039.0	155714.0
20	Linseed	30630.0	29869.0	33211.0	36854.0	41019.0	51726.0	44725.0	51675.7
21	Sesamum	184517.0	171797.0	185455.0	262293.0	262138.0	273218.0	394073.0	364886.0

22	Groundnut	1116533.0	1321075.0	1324092.0	2136954.0	1545700.0	1406323.0	2490727.0	2450047.0
23	Rapeseed & Mustard	1204711.0	1318370.0	1307393.0	1362588.0	1624669.0	1565330.0	1983918.0	2233530.0
24	Castor	131650.0	138270.0	167441.0	251161.0	266201.0	275970.0	612574.0	1126115.0
25	Coconut	717717.0	688257.0	653938.0	636016.0	751861.0	1083102.0	1598841.0	1329331.0
26	Nigerseed	19969.0	18782.0	19790.0	28047.0	26918.0	24084.0	29455.0	27148.4
27	Safflower	26535.0	30815.0	34650.0	47745.0	37601.0	36236.0	31235.0	30798.8
28	Sunflower	189417.0	226322.0	219535.0	341484.0	258359.0	161750.0	141850.0	143249.3
29	Soyabean	958661.0	1117657.0	1193064.0	1814831.0	1721774.0	2101784.0	2590766.0	2830732.0
30	Tamarind	16882.0	4268.0	5793.0	2608.0	8828.0	8783.0	9534.0	7147.0
31	Other Oilseeds	8124.0	9265.0	12451.0	15221.0	12964.0	32502.0	91252.0	70787.3
32	Sugarcane	1737850.0	2565942.0	3178268.0	3122631.0	2487352.0	4138163.0	5160140.0	6013886.0
33	Gur	1092910.0	899952.0	560438.0	622863.0	2011776.0	1973723.0	1649804.0	1561839.0
34	Other Sugars	13508.0	13927.0	14094.0	12966.0	15300.0	22232.0	24292.0	29107.8
35	Kapas	1706217.0	1888912.0	2211490.0	2959159.0	3038531.0	3409580.0	6486891.0	7742563.0
36	Jute	149928.0	208761.0	238088.0	200678.0	233686.0	384873.0	468615.0	421969.2
37	Sanhemp	2990.0	3416.0	4231.0	3799.0	4627.0	3348.0	4232.0	4008.9
38	Mesta	15686.0	17475.0	18782.0	17487.0	43837.0	13466.0	16263.0	18946.9
39	Other Fibres	1064.0	2583.0	2735.0	2213.0	6742.0	3911.0	3421.0	6895.2
40	Indigo,Dyes & Tanning Material	7145.0	6634.0	4467.0	7492.0	7496.0	2778.0	3034.0	8552.8
41	Tea	313420.0	331931.0	430719.0	388355.0	480702.0	568037.0	599884.0	617120.6
42	Coffee	200319.0	225096.0	227770.0	283534.0	335414.0	470690.0	519962.0	666175.1
43	Tobacco	249876.0	273940.0	238009.0	260299.0	565705.0	790575.0	784348.0	726960.5

44	Opium	5811.0	5884.0	4660.0	3585.0	6983.0	11705.0	14719.0	11800.8
45	Betel Leaves	254665.0	377604.0	372079.0	474084.0	466483.0	663383.0	736662.0	748432.0
46	Isabgol	13971.0	11927.0	18444.0	21260.0	37229.0	70110.0	54527.0	59882.5
47	Saffron	900.0	1669.0	909.0	938.0	1052.0	900.0	1500.0	4050.0
48	Cocoa	3788.0	4153.0	4820.0	4859.0	10287.0	9003.0	9800.0	14798.0
49	Other drugs	349990.0	431645.0	333669.0	537936.0	757596.0	1173591.0	954223.0	998524.1
50	Cardamom	36449.0	33154.0	31683.0	45061.0	63589.0	80731.0	123621.0	121996.1
51	Dry Chillies	450571.0	399995.0	490684.0	580762.0	700935.0	786036.0	884979.0	1099876.0
52	Black Pepper	57386.0	65471.0	69979.0	66491.0	54421.0	70294.0	112463.0	148867.3
53	Dry Ginger	146139.0	179759.0	145247.0	142081.0	160828.0	267969.0	393180.0	286131.2
54	Turmeric	197050.0	246351.0	178037.0	238405.0	329224.0	698416.0	1135952.0	727552.4
55	Arecanut	256660.0	362559.0	441597.0	354028.0	386993.0	395263.0	555846.0	793532.7
56	Garlic	120270.0	184575.0	244819.0	346929.0	263924.0	245100.0	431396.0	308838.2
57	Coriander	53721.0	61896.0	76152.0	144823.0	185564.0	155604.0	167184.0	192067.2
58	Fenel	15174.0	19714.0	27719.0	20369.0	15065.0	19524.0	47337.0	80403.6
59	Cumin	100052.0	90957.0	130137.0	189549.0	162250.0	204366.0	362601.0	578899.2
60	Ajwain	1805.0	1146.0	3490.0	4306.0	7442.0	4194.0	15392.0	21323.2
61	Methi	7377.0	5224.0	11406.0	17667.0	23137.0	20578.0	26527.0	28819.5
62	Tamarind	46663.0	47427.0	47713.0	47786.0	49446.0	55240.0	72620.0	86778.5
63	Nutmeg	1723.0	2183.0	10841.0	11410.0	14648.0	17962.0	29106.0	42324.5
64	Cloves	189.0	204.0	232.0	227.0	214.0	272.0	309.0	530.0
65	Other Condiments & Spices	91641.0	88839.0	111174.0	132553.0	108928.0	128201.0	261852.0	122050.2
66	Banana	845581.0	1057619.0	1359889.0	1376714.0	1482464.0	1990867.0	2324896.0	2498581.0

67	Cashewnut	147997.0	158193.0	159979.0	222137.0	239869.0	308905.0	244994.0	431839.1
68	Mango	1416774.0	1607056.0	1776036.0	1819773.0	1981567.0	2386429.0	2913056.0	3370228.0
69	Grapes	280821.0	319725.0	343914.0	247886.0	259983.0	165196.0	241460.0	371049.8
70	Papaya	236912.0	248954.0	271485.0	301994.0	373546.0	402814.0	322637.0	412224.1
71	Apple	253490.0	259507.0	197639.0	255157.0	277877.0	286623.0	434039.0	358992.8
72	Mosambi	232807.0	254793.0	362877.0	431375.0	418797.0	447213.0	237247.0	141655.6
73	Lemon	173057.0	243952.0	308251.0	309872.0	382193.0	427950.0	467929.0	475441.8
74	Orange	249835.0	268557.0	271322.0	300056.0	425826.0	595731.0	864813.0	904392.1
75	Other Citrus Fruits Litchi	76799.0	45659.0	55483.0	57759.0	86030.0	137395.0	5200.0	87989.6
76	Litchi	83379.0	90901.0	98849.0	102941.0	140453.0	163856.0	177728.0	223739.3
77	Pineapple	111056.0	112439.0	121201.0	142746.0	154374.0	168712.0	185072.0	236327.6
78	Sapota	116784.0	127604.0	145260.0	123868.0	143500.0	183295.0	203576.0	201696.6
79	Cherry	3905.0	4354.0	4656.0	4726.0	5867.0	5840.0	3821.0	7041.9
80	Almonds	13302.0	18735.0	19101.0	16859.0	12423.0	16440.0	17177.0	5990.8
81	Jack-fruit	81822.0	99180.0	106073.0	106814.0	107151.0	155950.0	181344.0	167704.1
82	Sub-Tropical Fruits	406.0	507.0	507.0	507.0	543.0	569.0	788.0	404.7
83	Peas	36798.0	31019.0	30857.0	34173.0	39145.0	50647.0	47953.0	68252.5
84	Walnut	78141.0	91330.0	97505.0	126900.0	151705.0	115827.0	141974.0	231112.4
85	Guava	171481.0	166831.0	187448.0	215328.0	237869.0	363835.0	308800.0	303930.6
86	Other temperate fruits	3296.0	2730.0	2730.0	2730.0	3091.0	8658.0	5109.0	1265.2
87	Potato	877465.0	1170656.0	1169363.0	1350613.0	1155810.0	1720143.0	1878715.0	2129459.0
88	Sweet Potato	80055.0	81492.0	87077.0	109445.0	111625.0	134920.0	128912.0	136073.5

89	Tapoica	214797.0	299523.0	292513.0	322541.0	331046.0	412625.0	474394.0	550465.0
90	Onion	359315.0	470729.0	554997.0	683007.0	706562.0	803036.0	1435072.0	1360653.0
91	Brinjal	646883.0	717827.0	818331.0	991602.0	1076183.0	1057782.0	1390280.0	1642778.0
92	Cabbage	382564.0	401148.0	427250.0	527086.0	569543.0	595022.0	717113.0	847037.9
93	Cauliflower	534218.0	589370.0	652905.0	821448.0	851687.0	867755.0	961015.0	1177867.0
94	Okra	343130.0	426646.0	456803.0	505676.0	577254.0	659562.0	831857.0	1070028.0
95	Tomato	610130.0	703636.0	818380.0	975407.0	1105175.0	1178498.0	1796515.0	2030198.0
96	Drumsticks	2876.0	2570.0	2786.0	2118.0	2042.0	2392.0	2403.0	193781.3
97	green Peas	242810.0	282024.0	342569.0	327044.0	433648.0	499812.0	553442.0	661247.6
98	Other Fruits	618473.0	646925.0	666216.0	619738.0	817133.0	987318.0	1110953.0	1259601.0
99	Other Vegetables	1304613.0	1692524.0	1929382.0	2118530.0	2250851.0	2636135.0	3093929.0	3446935.0
100	Floriculture	502285.0	594759.0	730189.0	771070.0	884579.0	1119002.0	1397215.0	1736538.0
101	Rubber	387080.0	501781.0	743843.0	731631.0	856703.0	891357.0	1500783.0	1716422.0
102	Guarseed	86685.0	160403.0	180012.0	286640.0	279604.0	130537.0	146592.0	2229639.0
103	Misc. Food Crops	1638.0	1700.0	1989.0	2150.0	2288.0	1480.0	2415.0	7218.8
104	Misc. Non-Food Crops	61978.0	66977.0	70288.0	77873.0	81617.0	81629.0	90179.0	158638.6
105	Fodder	1679978.0	1651278.0	1667807.0	1809651.0	1866314.0	2305607.0	2833647.0	3249446.0
106	Grass	659004.0	706466.0	771550.0	865936.0	1133819.0	1433913.0	1708611.0	1783720.0
107	Mulberry	3542.0	3542.0	4758.0	4501.0	4371.0	4175.0	3274.0	3713.0
108	Mushroom	23551.0	25183.0	25693.0	26043.0	30085.0	44365.0	42295.0	48678.4
109	Straw & Stalks	2758020.0	3170122.0	3506061.0	3683213.0	4128322.0	4786187.0	5302239.0	6088723.0
110	Other By-	273340.0	340202.0	396200.0	410505.0	520782.0	566784.0	731239.0	796814.2

	Products								
111	Kitchen Garden	271356.0	295314.0	327592.0	327122.0	368745.0	410955.0	477841.0	510729.2
112	Milk	12390679.0	13281210.0	14499863.0	16525441.0	19499263.0	22868308.0	26380725.0	32776720.0
113	Egg	585021.0	627573.0	741765.0	890029.0	1044485.0	1337261.0	1542994.0	1663274.0
114	Wool & hair	32568.0	34130.0	35076.0	34965.0	40739.0	44719.0	44277.0	49648.3
115	Dung	1605086.0	1655375.0	1836942.0	1966558.0	2227824.0	2483732.0	2759599.0	3259891.0
116	Silkworm Cocoons & Honey	169883.0	205006.0	226674.0	227817.0	261994.0	324407.0	396635.0	432639.6
117	Increment in Stock	94251.0	160586.0	237158.0	444863.0	655565.0	889941.0	1202884.0	971030.2
118	Meat	3125871.0	3381153.0	3957539.0	4628351.0	5484782.0	6666328.0	7788847.0	9621931.0
119	Industrial Wood	3708934.0	4134149.0	5066845.0	4380996.0	4984399.0	5544636.0	6129311.0	7425186.0
120	Fuel Wood	2619467.0	3042301.0	3611517.0	4055615.0	4656102.0	5264508.0	5985317.0	4814741.0
121	Non-Timber Forest Product	974898.0	1028665.0	1171177.0	1197401.0	1317406.0	1579203.0	1810142.0	2637926.0
122	Inland Fish	1574263.0	1785775.0	2039364.0	2271232.0	2766459.0	3314432.0	3907041.0	4618119.0
123	Marine fish	1624589.0	1969815.0	2130444.0	2305044.0	2398972.0	2577693.0	2820684.0	3392335.0

Annexure-2

Estimated Parameters of Linear Model

Sr. No.	Crops	Alpha	Beta
1	Paddy	-2807684149.00	1404443.00
2	Wheat	-1869880734.00	935499.40
3	Jowar	-161846730.40	80968.46
4	Bajra	-149499387.20	74802.04
5	Barley	-33185513.43	16593.86
6	Maize	-414459129.10	207145.60
7	Ragi	-28020812.82	14029.89
8	Small Millets	-3858539.82	1936.61
9	Other Cereals	-3119217.46	1559.11
10	Gram	-343689841.00	171932.10
11	Arhar	-216828427.00	108379.60
12	Urd	-126046647.60	62995.71
13	Moong	-129117024.20	64501.93
14	Masoor	-62411253.29	31224.29
15	Horsegram	-8459212.46	4231.54
16	Moth	207684.61	-80.11
17	Lakh/Khesari	-13657493.75	6829.39
18	Peas/Chawali	-4112941.71	2109.86
19	Other Pulses	-47830736.14	23890.57
20	Linseed	-6685661.18	3350.25
21	Sesamum	-64850335.25	32435.46
22	Groundnut	-321986042.40	161238.80
23	Rapeseed & Mustard	-224221707.20	112457.70
24	Castor	-129971766.30	64890.43
25	Coconut	-252220284.50	126106.60

26	Nigerseed	-3286969.64	1649.64
27	Safflower	-1964356.54	996.18
28	Sunflower	16922429.11	-8322.18
29	Soyabean	-528297028.70	264045.70
30	Tamarind	723379.89	-356.39
31	Other Oilseeds	-21217481.46	10584.68
32	Sugarcane	-908581192.40	454299.90
33	Gur	-376455895.40	188198.60
34	Other Sugars	-3579353.57	1791.71
35	Kapas	-1302195274.00	650371.40
36	Jute	-93191238.04	46567.25
37	Sanhemp	-281904.64	142.36
38	Mesta	-1324835.43	670.29
39	Other Fibres	-981195.07	490.50
40	Indigo, Dyes & Tanning Material	1225260.57	-607.71
41	Tea	-98585461.32	49342.39
42	Coffee	-111334828.10	55634.32
43	Tobacco	-212030845.20	105870.80
44	Opium	-2908908.39	1453.18
45	Betel Leaves	-150903922.50	75426.89
46	Isabgol	-18375923.61	9172.11
47	Saffron	-27905.82	14.46
48	Cocoa	-2373270.75	1185.82
49	Other drugs	-266033036.60	132875.60
50	Cardamom	-27793388.57	13877.71
51	Dry Chillies	-163212037.50	81627.04
52	Black Pepper	-11348829.04	5689.96
53	Dry Ginger	-66679966.29	33325.86

54	Turmeric	-277109157.90	138286.50
55	Arecanut	-64716812.50	32441.50
56	Garlic	-76686881.39	38340.46
57	Coriander	-45554097.96	22757.75
58	Fenel	-5958377.75	2980.54
59	Cumin	-74840085.64	37377.79
60	Ajwain	-3636520.11	1814.61
61	Methi	-7143912.82	3567.46
62	Tamarind	-6773536.79	3401.07
63	Nutmeg	-8410682.36	4196.93
64	Cloves	-34027.07	17.07
65	Other Condiments & Spices	-41951393.75	20968.25
66	Banana	-459188178.30	229536.30
67	Cashewnut	-47978137.11	24010.89
68	Mango	-446229110.60	223325.80
69	Grapes	36898480.14	-18252.60
70	Papaya	-47498118.71	23819.86
71	Apple	-48182481.82	24147.04
72	Mosambi	-32207075.86	16217.14
73	Lemon	-94755037.93	47376.93
74	Orange	-189794426.50	94778.07
75	Other Citrus Fruits Litchi	122098.07	-27.79
76	Litchi	-33606553.54	16805.75
77	Pineapple	-26218784.61	13134.54
78	Sapota	-26371801.36	13214.21
79	Cherry	-277030.04	140.39
80	Almonds	-9298.25	12.75
81	Jack-fruit	-29496676.86	14756.57
82	Sub-Tropical Fruits	-93065.50	46.64

83	Peas	-5767953.39	2893.18
84	Walnut	-21008404.39	10524.75
85	Guava	-61148583.36	30585.21
86	Other temperate fruits	-1261507.71	630.57
87	Potato	-291774112.00	146041.80
88	Sweet Potato	-19820061.46	9927.68
89	Tapoica	-74463247.86	37268.86
90	Onion	-289112617.10	144408.90
91	Brinjal	-226117361.40	113141.20
92	Cabbage	-109415461.10	54774.57
93	Cauliflower	-145179428.90	72712.25
94	Okra	-146574697.70	73302.29
95	Tomato	-342720241.20	171274.10
96	Drumsticks	183013.61	-89.96
97	green Peas	-104163802.20	52091.11
98	Other Fruits	-164735106.30	82469.39
99	Other Vegetables	-540936093.50	270594.20
100	Floriculture	-277805330.90	138845.20
101	Rubber	-302622183.40	151182.90
102	Guarseed	-15557756.25	7842.18
103	Misc. Food Crops	-155024.64	78.21
104	Misc. Non-Food Crops	-8900946.00	4472.71
105	Fodder	-354138002.70	177434.70
106	Grass	-354914739.00	177356.60
107	Mulberry	-1352.61	2.68
108	Mushroom	-7064287.71	3535.29
109	Straw & Stalks	-819470310.00	410251.70
110	Other By-Products	-139413924.70	69694.39
111	Kitchen Garden	-63575268.93	31853.21

112	Milk	-4723167578.00	2362276.00
113	Egg	-328468771.20	164143.40
114	Wool & hair	-4403710.00	2213.14
115	Dung	-392953838.60	196826.20
116	Silkworm Cocoons & Honey	-68149535.07	34084.93
117	Increment in Stock	-372418290.00	185822.00
118	Meat	-1578125577.00	788804.30
119	Industrial Wood	-711911376.20	357130.70
120	Fuel Wood	-1113045162.00	556662.50
121	Non-Timber Forest Product	-267715346.10	134037.00
122	Inland Fish	-770368962.00	385098.00
123	Marine fish	-361333465.00	181163.20

Annexure-3

Estimated Parameters of ARIMA with Logarithmic Transformation

Sr. No.	Crops	p	d	q
1	Paddy	5	3	2
2	Wheat	4	3	2
3	Jowar	4	2	2
4	Bajra	1	3	1
5	Barley	3	3	1
6	Maize	5	3	2
7	Ragi	3	3	2
8	Small Millets	4	2	3
9	Other Cereals	5	2	1
10	Gram	3	3	2
11	Arhar	4	3	3
12	Urd	5	2	1
13	Moong	5	2	1
14	Masoor	3	3	2
15	*Horsegram*	4	2	2
16	Moth	4	2	3
17	Lakh/Khesari	3	3	4
18	Peas/Chawali	4	2	1
19	Other Pulses	3	3	1
20	Linseed	1	3	1
21	Sesamum	5	3	4
22	Groundnut	4	2	1
23	Rapeseed & Mustard	5	3	3
24	Castor	5	2	5
25	Coconut	2	4	1
26	Nigerseed	4	2	5
27	Safflower	5	2	4
28	Sunflower	4	2	2
29	Soyabean	3	3	1
30	Tamarind	4	2	1
31	Other Oilseeds	4	2	5
32	Sugarcane	5	2	3
33	Gur	4	2	2
34	Other Sugars	4	3	1
35	Kapas	3	3	3
36	Jute	5	3	2
37	Sanhemp	4	2	1
38	Mesta	5	2	1
39	Other Fibres	5	2	1
40	Indigo,Dyes& Tanning Material	4	2	1

41	Tea	3	3	1
42	Coffee	5	3	2
43	Tobacco	5	3	3
44	Opium	3	3	1
45	Betel Leaves	4	3	1
46	Isabgol	1	3	1
47	Saffron	5	2	2
48	Cocoa	3	3	1
49	Other drugs	1	3	1
50	Cardamom	5	3	2
51	Dry Chillies	1	3	1
52	Black Pepper	5	2	1
53	Dry Ginger	5	2	1
54	Turmeric	3	4	4
55	Arecanut	4	2	1
56	Garlic	5	2	1
57	Coriander	4	3	2
58	Fenel	5	2	4
59	Cumin	5	3	1
60	Ajwain	4	2	1
61	Methi	4	3	2
62	Tamarind	2	2	1
63	Nutmeg	3	3	3
64	Cloves	4	2	2
65	Other Condiments & Spices	4	2	2
66	Banana	3	3	1
67	Cashewnut	1	3	1
68	Mango	3	3	5
69	Grapes	4	2	1
70	Papaya	5	2	1
71	Apple	5	2	2
72	Mosambi	4	2	1
73	Lemon	4	3	1
74	Orange	4	4	1
75	Other Citrus Fruits Litchi	4	2	3
76	Litchi	3	3	2
77	Pineapple	3	3	1
78	Sapota	3	3	3
79	Cherry	4	2	2
80	Almonds	5	2	5
81	jack-fuits	5	3	2
82	Sub-Tropical Fruits	1	2	1
83	Peas	1	3	1
84	Walnut	4	2	1
85	Guava	4	3	1
86	Other temperate fruits	5	2	2

87	Potato	3	3	1
88	Sweet Potato	5	3	1
89	Tapoica	4	3	1
90	Onion	4	3	1
91	Brinjal	1	3	1
92	Cabbage	3	3	1
93	Cauliflower	5	3	4
94	Okra	3	3	2
95	Tomato	1	3	1
96	Drumsticks	4	2	2
97	green Peas	3	3	4
98	Other Fruits	3	3	1
99	Other Vegetables	3	3	1
100	Floriculture	3	3	2
101	Rubber	1	3	2
102	Guarseed	4	2	2
103	Misc. Food Crops	4	2	1
104	Misc. Non-Food Crops	3	3	1
105	Fodder	5	3	3
106	Grass	5	3	4
107	Mulberry	5	2	1
108	Mushroom	4	3	1
109	Straw & Stalks	3	3	1
110	Other By-Products	3	3	1
111	Kitchen Garden	5	3	1
112	Milk	2	4	2
113	Egg	3	3	4
114	Wool & hair	3	3	1
115	Dung	3	3	1
116	Silkworm Cocoons & Honey	4	3	2
117	Increment in Stock	4	3	1
118	Meat	3	4	2
119	Industrial Wood	4	3	1
120	Fuel Wood	5	3	1
121	Non-Timber Forest Product	4	3	3
122	Inland Fish	3	4	1
123	Marine fish	3	3	2

Annexure-4

Estimated Parameters of ARIMA with Transfer Function

Sr. No.	Crops	p	d	q
1	Paddy	4	0	2
2	Wheat	5	0	2
3	Jowar	5	0	2
4	Bajra	5	0	3
5	Barley	5	0	1
6	Maize	5	0	5
7	Ragi	5	0	2
8	Small Millets	5	0	3
9	Other Cereals	5	0	5
10	Gram	4	2	1
11	Arhar	5	0	2
12	Urd	4	0	1
13	Moong	5	0	1
14	Masoor	4	0	5
15	Horsegram	5	0	3
16	Moth	4	2	2
17	Lakh/Khesari	4	0	5
18	Peas/Chawali	4	0	2
19	Other Pulses	5	0	2
20	Linseed	5	0	2
21	Sesamum	4	0	3
22	Groundnut	5	0	2
23	Rapeseed & Mustard	5	0	2
24	Castor	5	0	3

25	Coconut	5	2	2
26	Nigerseed	5	0	4
27	Safflower	5	2	3
28	Sunflower	5	0	4
29	Soyabean	4	0	2
30	Tamarind	5	0	2
31	Other Oilseeds	5	0	1
32	Sugarcane	4	0	4
33	Gur	5	0	5
34	Other Sugars	4	0	5
35	Kapas	5	0	1
36	Jute	5	0	1
37	Sanhemp	5	0	1
38	Mesta	5	0	3
39	Other Fibres	5	0	5
40	Indigo,Dyes& Tanning Material	5	0	4
41	Tea	5	0	3
42	Coffee	5	0	3
43	Tobacco	5	0	3
44	Opium	5	0	1
45	Betel Leaves	4	0	1
46	Isabgol	5	0	3
47	Saffron	5	0	1
48	Cocoa	5	0	3
49	Other drugs	5	0	3
50	Cardamom	4	2	1
51	Dry Chillies	5	0	3
52	Black Pepper	5	0	3
53	Dry Ginger	5	0	5

54	Turmeric	5	0	3
55	Arecanut	4	0	2
56	Garlic	5	0	2
57	Coriander	5	0	3
58	Fenel	5	0	3
59	Cumin	4	0	1
60	Ajwain	5	0	1
61	Methi	5	0	4
62	Tamarind	4	2	1
63	Nutmeg	5	0	2
64	Cloves	4	0	1
65	Other Condiments & Spices	4	0	3
66	Banana	5	0	1
67	Cashewnut	5	0	1
68	Mango	5	0	2
69	Grapes	5	0	1
70	Papaya	5	0	1
71	Apple	5	2	1
72	Mosambi	1	2	1
73	Lemon	4	0	3
74	Orange	5	2	5
75	Other Citrus Fruits Litchi	5	0	2
76	Litchi	5	0	2
77	Pineapple	4	0	1
78	Sapota	5	0	3
79	Cherry	5	0	5
80	Almonds	5	0	4
81	Jack-fruit	4	0	1
82	Sub-Tropical Fruits	5	0	1

83	Peas	5	0	4
84	Walnut	5	0	1
85	Guava	5	0	4
86	Other temperate fruits	5	0	3
87	Potato	4	0	1
88	Sweet Potato	4	0	1
89	Tapoica	5	0	3
90	Onion	5	0	2
91	Brinjal	5	0	1
92	Cabbage	4	0	2
93	Cauliflower	4	0	2
94	Okra	5	0	5
95	Tomato	5	0	3
96	Drumsticks	5	0	3
97	green Peas	5	0	3
98	Other Fruits	5	0	2
99	Other Vegetables	5	0	1
100	Floriculture	5	0	1
101	Rubber	4	0	5
102	Guarseed	4	2	1
103	Misc. Food Crops	5	0	1
104	Misc. Non-Food Crops	5	0	2
105	Fodder	5	2	1
106	Grass	3	0	1
107	Mulberry	4	2	1
108	Mushroom	5	0	5
109	Straw & Stalks	4	0	2
110	Other By-Products	5	0	4
111	Kitchen Garden	5	0	5

112	Milk	5	2	2
113	Egg	5	0	4
114	Wool & hair	5	0	2
115	Dung	4	2	5
116	Silkworm Cocoons & Honey	4	0	3
117	Increment in Stock	5	2	1
118	Meat	5	0	5
119	Industrial Wood	4	0	1
120	Fuel Wood	5	2	2
121	Non-Timber Forest Product	5	0	4
122	Inland Fish	5	0	2
123	Marine fish	5	0	4