A Comparative Study of Price Indices of Some Essential Agricultural Commodities

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Abstract- This research paper deals with the comparative study of rise in the prices of various commodities which are very commonly used in India. The rise in prices are studied for past twelve years i.e. from the year 2005 to 2016. For this, some commonly used food grains such as rice, wheat, jowar and bajra are studied for their variations in the prices year wise. Also the most popular and required types of vegetable such as onion, tomato and potato are considered for comparative study of fluctuations in prices. This research paper also gives the behavioral changes in the prices of the mostly desired fruits such as banana, apple, mango and orange. To study all about these, Index numbers are used which is a useful way of expressing economic data time series and comparing commodities. With the help of time series analysis and index number theory, it is tried to study the comparative variations among the prices of various products which are very important in our day to day life. In this paper, an attempt is made to study the inflation rate, reasons behind the fluctuations and its impact on farmers and customers. Also it is tried to study whether these variations are very significant or not.

Key Words: - Price index, inflation rate, time series, variation, fluctuation, trend..

I. INTRODUCTION

In India, inflation or price rise is very important concept because the people of lower strata are most severely affected by the rising prices, and if the price rise is in essential commodities, damage is more severe. The sharp increase in prices of wheat and rice will have an inflationary impact on essential commodities as open market prices of both commodities were ruling slightly higher than above the poverty line prices. In the last five years, the prices of essential commodities have gone up by nearly 72 percent. It can be observed that demand as well as supply, both factors are responsible for rise in prices of essential commodities. Increasing population which itself is a major cause of rising demand, changing food habits are also giving push to demand pull inflation. On the supply side, unfavorable weather conditions also resulted in the short supply of commodities and consequently pushed their prices up. Lack of warehousing facilities, cold storages also results in the post-harvest losses. Thus, the price rise is caused by several factors like hording, population explosion, low productivity, natural calamities, evil motives of dishonest businessmen, black marketing etc. In this research, we considered food grains such as rice, wheat, jowar and bajra to have a comparative study about their price variations and trend in price index numbers. This research is about only these prominent food grains because rice is India's pre-eminent crop and is the staple food of the people of the eastern and southernparts of the country. Also wheat is second largest cereal in India after rice. Jowar is an important cereal crop after rice and wheat in India. Bajra is one of the major crops in India. Bajra is a coarse grain crop and considered to be the poor man's stale nourishment and suitable to cultivate in

dry land. Similarly, among the vegetables, this research deals only with the study of potato, onion and tomato.

Potato is the fourth most important food crop with great potential as a food source for future generation in the world as well as in India. This crop is known for sustaining millions of population. Also onion and tomato are some of the most important type of vegetables which are widely used in India. Because of its huge demand all over the country, its production is very important and changes in prices of these basic vegetables is very useful to study. For fruits, this research mainly deals with Mango, Orange, Apple and Banana. Mango being an important fruit crop in India is the most widely cultivated fruit in India. Banana is an important fruit crop in India. The global production of banana is around 102028.17 thousand tons of which India contributes 29.19%. The apple business in India is major production of the fruit. Orange occupies nearly 40% of area for its cultivation in India. And because of its nutritional values and medicinal properties, it is again one of the popular fruits in India. With the help of past data about prices of these commodities, we tried to show some important results as follows:

Statistical Analysis:

This paper studies the time series of some of the essential food grains such as wheat, rice, jowar and bajra. Also the most commonly used vegetables such as onion, potato and tomato are considered. It also studies the time series of mostly consumed fruits such as banana, mango, apple and orange. All these agricultural commodities are studied for their trend of variations in the price indices for the time series from year 2005 to 2016. For this, we have taken 2004
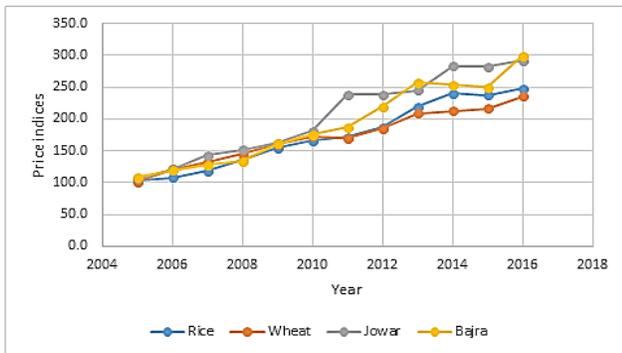
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as base year (i.e 100 price index) and secondary data used from the website http://agmarknet.gov.in.

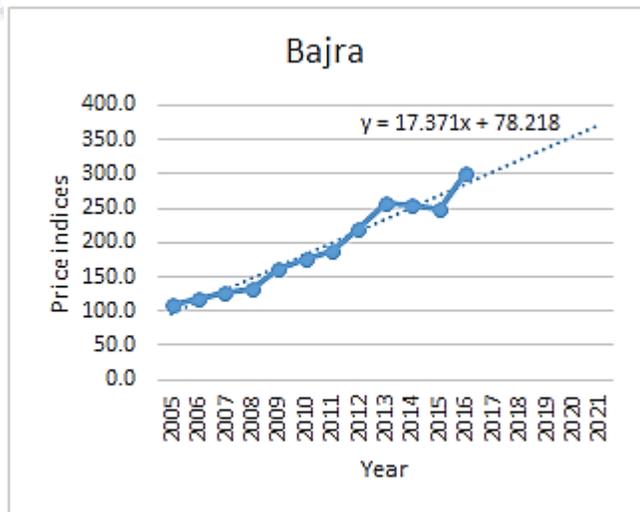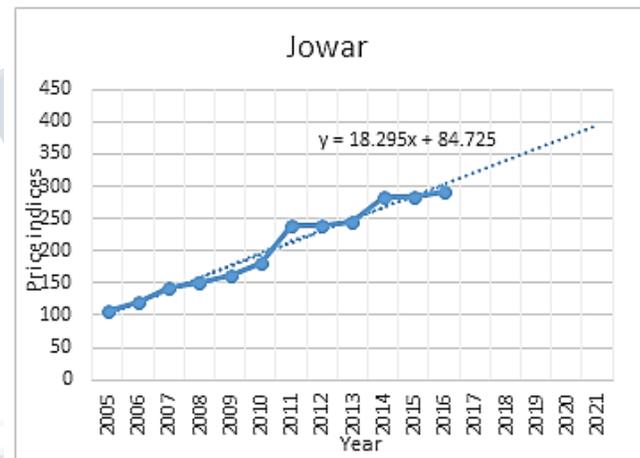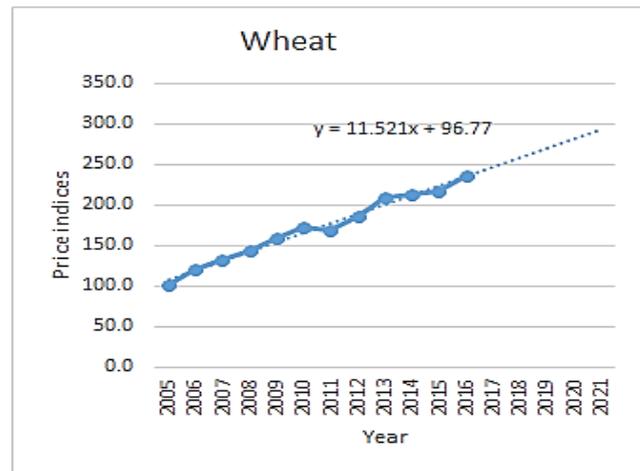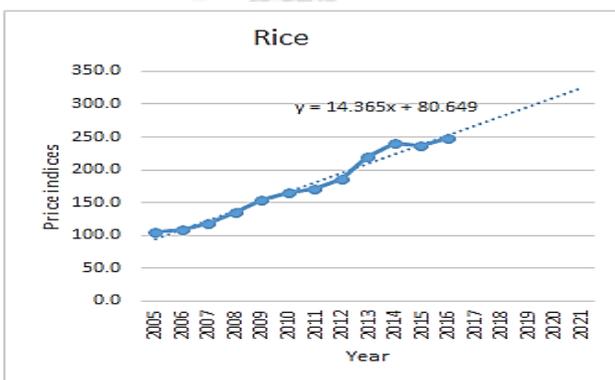**1) Food grains (Wheat, Rice, Jowar, Bajra)**

From the given data, the year wise price indices of various commodities are calculated as follows:

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Rice	104.4	107.8	118.7	135.6	154.2	165.9	171.2	186.5	219.5	239.8	237.0	247.70
Wheat	100.8	121.3	132.8	144.5	159.8	172.2	169.5	185.4	208.9	212.6	216.3	235.82
Jowar	106.1	120.8	142.8	151.4	162.3	181.6	238.0	237.9	245.3	283.5	282.2	291.77
Bajra	108.3	119.3	128.0	133.7	161.5	175.0	187.2	219.5	257.5	253.9	250.0	299.70

The pattern of changes the price indices and comparison between the fluctuations can be seen in the following graph.

From this graph, it is clear that jowar and bajra have maximum fluctuations as well as rise in price index as compared to rice and wheat. This may be because of less production and more demand as well as the awareness about the diet among people. Also the graph shows that the prices of all the above food grains were smoothly increasing till 2010 and then more fluctuations in prices seen from 2010 onwards. Also this paper studied the changes in the price indices of these food grains individually and a model tried to fit which can help to predict the future price indices for the upcoming years as follows:

Through these graphs, it is tried to estimate the price indices for the next five years with the help of trend of the previous year's values.

Thus, from above graph, the trend line gives the future estimated values of price indices of rice, wheat, jowar and bajra for the next five years which may help to study about the future inflation rate.
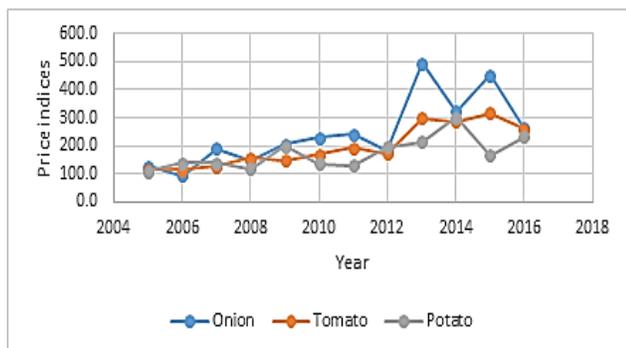
Also by analyzing the above data, we get model equations for rice, wheat, jowar and bajra with which we can estimate price indices of these commodities for any future period as follows.

i)   For rice   : $y = 14.365x + 80.649$
ii)   For wheat   : $y = 11.521x + 96.77$
iii)   For jowar   : $y = 18.295x + 84.725$
iv)   For Bajra   : $y = 17.371x + 78.218$
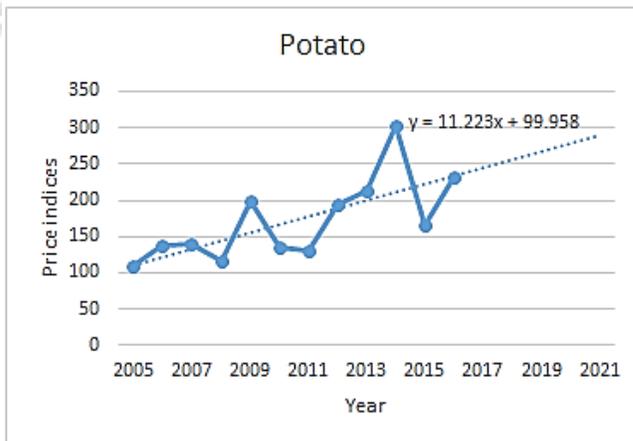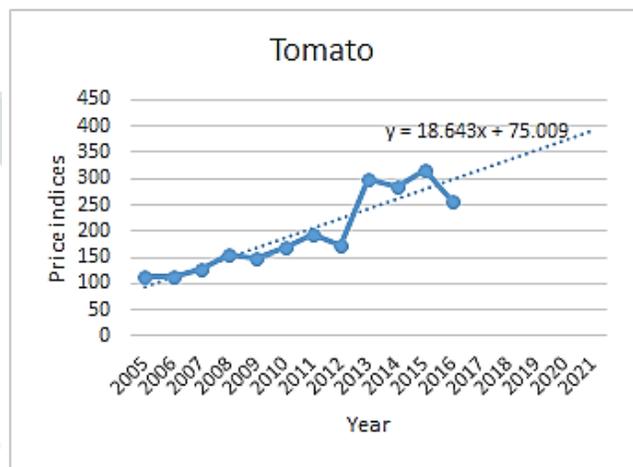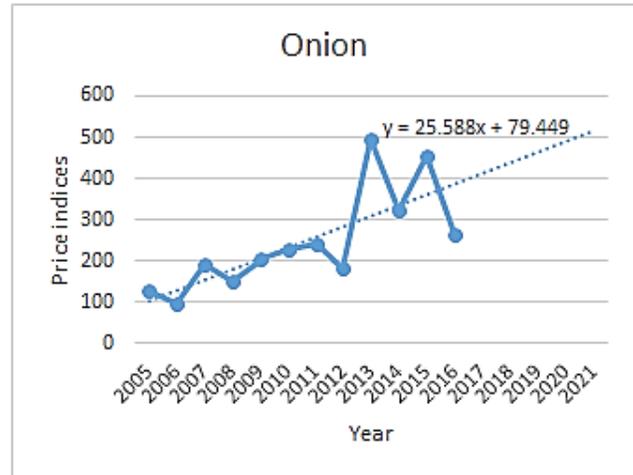2)   Vegetables (Onion, Tomato, Potato)

From the data given on http://agmarknet.gov.in for onion, tomato and potato, the year wise price indices of these commodities is calculated as follows:

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Onion	126.6	94.9	189.9	149.3	204.4	228.8	239.9	183.9	494.3	321.3	453.1	262.94
Tomato	114.1	114.8	126.2	156.0	149.3	168.7	192.8	172.1	299.0	286.5	316.0	258.81
Potato	108.5	138.6	139.9	116.2	198.6	134.6	130.0	194.8	212.9	302.7	166.9	230.97

This data can be represented in the graphical form as follows:

This shows that the price of onion has been most inconsistently changing since 2005. Particularly the most fluctuations in its prices can be seen since 2012. Whereas, very much ups and downs can be seen in the prices of potato in last 12 years' time series. As compared to onion and potato, the prices of tomato are steadily increasing. The individual price variations in onion, potato and tomato can be seen in following graphs which also will help to predict the rise in their respective prices for the next five year. Also a model is developed for each of this with help of previous 12 years data, which can be used to forecast the price indices for any of the upcoming years as follows.

Thus, from above graph, the trend line gives the future estimated values of price indices of onion, potato and tomato for the next five years which may help to study about the future inflation rate.
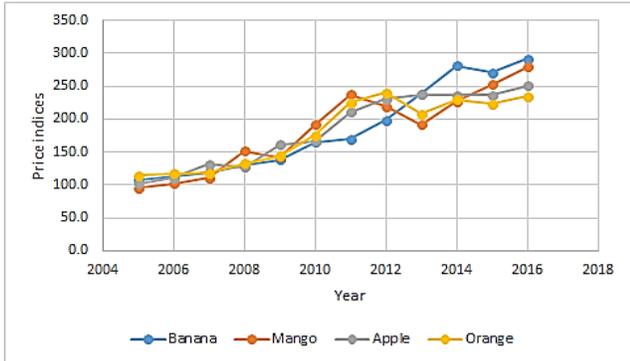
Also by analyzing the above data, we get model equations for onion, potato and tomato with which we can estimate price indices of these commodities for any future period as follows.

i) For onion : y = 25.588x + 79.449
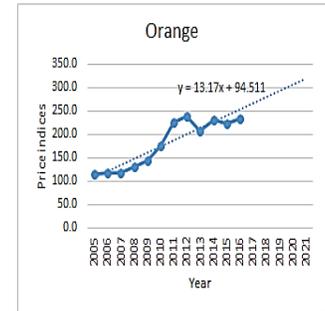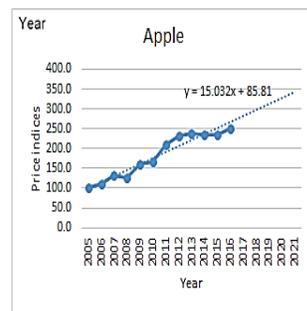ii) For tomato : y = 18.643x + 75.009
iii) For potato : y = 11.223x +99.958

3) Fruits (Banana, Mango, Apple, Orange)

From the data given on http://agmarknet.gov.in for banana, mango, apple and orange, the year wise price indices for these is calculated as follows:

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Banana	107.7	113.6	119.3	129.8	138.3	164.9	170.1	198.0	238.6	281.6	271.1	291.78
Mango	95.0	101.9	110.4	151.7	142.0	191.5	237.2	219.7	191.5	226.6	252.7	279.23
Apple	102.5	110.7	131.6	126.7	161.1	167.1	211.1	230.8	237.3	236.5	236.4	250.43
Orange	114.6	117.0	118.2	132.1	143.5	175.8	225.4	240.4	207.5	230.0	222.6	234.27

This graph shows that banana and apple are consistently increasing in their prices since last 12 years. But mango and orange are showing much fluctuations in their trend values. Although all the fruits are showing increasing trend for their future values. And roughly they all are following the linear model. Individually, each of the fruit can be studied for its variations in the price indices year by year as follows. Also, a particular model is tried to develop for forecasting purpose.

Thus, from above graph, the trend line gives the future estimated values of price indices of banana, mango, and apple, orange for the next five years which may help to study about the future inflation rate.

Also by analyzing the above data, we get model equations for banana, mango, and apple, orange with which we can estimate price indices of these commodities for any future period as follows.

i)   For banana : y = 18.553x + 64.801
ii) For mango : y = 16.344x + 77.041
iii) For apple : y = 15.032x + 85.81
iv) For orange : y = 13.17x + 94.511

II. CONCLUSION AND SOLUTION

Thus, from the above research it is clear that considerable fluctuation in price indices among the essential agricultural commodities and this is not good sign for farmers as well as consumers. A rise in prices is sign of development and prosperity but with more fluctuation is very dangerous for agricultural sector. These fluctuation in agricultural commodities have caused great unrest and frustration among the people. A comprehensive reforms on agricultural government policies, development of agriculture sector, control on hoarders and black marketers, etc. is very necessary to control on inflation rate of essential commodities.

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