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Study on price variability of Chilli at Byadgi market of Karnataka

KN Krishnamurthy^{1*}, KB Murthy², Pramit Pandit³

¹⁻³ Department of Agricultural Statistics, Applied Mathematics and Computer Sciences, University of Agriculture Sciences, Bengaluru, Karnataka, India

Abstract

The present study analyzes the trend and variability in prices of chilli in Byadgi market of Karnataka. The time series data on prices of chilli over the period of 16 years from 2003 to 2018 for Byadgi market were collected. Trend analysis was carried out by fitting suitable polynomials for the prices during study the period. The results revealed that the prices of chilli were found to be best fitted with a 2nd degree polynomial was found to be the best fit with maximum adjusted R² value (0.772), where both coefficient of linear and quadratic term were found significant at 1 per cent level. Further, an overall 47 per cent variation in prices was observed in Byadgi market. It was also found that the maximum price recorded to be 13644 Rupees/Quintal during January, 2018 while the minimum price recorded to be 1403 Rupees/Quintal in July, 2003.

Keywords: Byadgi market, chilli, Karnataka market, price variability

1. Introduction

Byadgi chilli is a famous variety of chilli mainly grown in Karnataka. The business involving Byadgi chillies has the second largest turnover among all chilli varieties of India. The Oil, oleoresin extracted from these chillies is used in the preparation of nail polish and lipsticks. Byadgi chilli is also known for its deep red colour and is less spicy and is used in many food preparations of South India. It has been accorded Geographical Indication in February 2011. Its GI tag is 144.

The variations in market arrivals and prices can be broadly categorized into two types. The first one comprises of fluctuations observed over time, generally referred as 'Temporal variations' and is the consequence of complex mixture of changes associated with trend, cyclical, seasonal and irregular components. The second comprises of fluctuations over space and are referred as 'Spatial variation' and is the result of differences in location and seasonality of production, transportation bottlenecks etc. These factors, in turn, bring changes in the cropping pattern and the income of the farmers. The upward trends in arrivals are associated with development in technology of production, input supply and infrastructure. The market arrivals of the selected commodities and their competing crops were the major factors influencing their prices in the market. On the other hand, instability in the farm prices tended to cause inefficient allocation of resources and induce income fluctuations over time and across different categories of farmers. Average price and production of the commodity were the major factors that determined market arrivals^[1]. Larger production and larger arrivals were noticed to reflect adverse effect on the prices. But in a mixed economy condition, a certain amount of direction is given to the market forces and this law may not always hold good. This control mechanism of the market forces may aim at

regulating market supplies or consumption or both, particularly in the case of commodity in short reaction among the sellers and buyers. The effect of these reactions at once gets reflected in the supply and price position. Thus, in mixed economy it would be necessary to study the market arrivals and prices and to know the factors influencing them. The behavior of market arrivals and prices had been studied earlier^[2, 3]. An econometric analysis of sunflower arrivals and prices was also done by the researchers^[4]. Thus, in a mixed economy, it would be necessary to study the trends and variability in prices and to know the factors influencing them.

2. Materials and methods

Realizing the above mentioned facts, the present study was conducted to analyze statistically the trends and variability in prices of Chilli in Byadgi market of Karnataka. A time series data on monthly market prices (Rupees/Quintal) for the period from January 2003 to May 2018 were collected from the Agricultural Produce Marketing Committees (APMC's) located at Byadgi.

As the study was empirical in nature, descriptive statistics were computed in order to obtain initial idea about the data. Over a long period of time, time series was very likely to show a tendency to increase or decrease over time. The factors responsible for such changes in time series are the growth of population, change in the taste of people, technological advances in the field, etc. Often, it might be possible to describe such movements with a structured mathematical model. In the absence of such a definite format, approximately a polynomial or a free hand curve could describe the movements. In the present study, secular trend and variability in prices were considered. Polynomial models upto 6th degree had been fitted and as model

Adequacy criteria, adjusted R² had been considered instead of R² as number of variables were varying with the fitted polynomials [5, 6, 7]. The adjusted R² can be negative and will always be less than or equal to R² [8, 6].

$$\text{Adjusted } R^2 = 1 - (1 - R^2) \frac{(n-1)}{(n-k-1)}$$

Where,

K is the number of parameters in the equation

N is the total number of observations

3. Results and Discussion

From table 1, it could be observed that the highest (Rs. 13644/Quintal) and lowest (Rs. 1403/Quintal) price were noticed

in January, 2018 and July, 2003, respectively. It could be also noticed that Chilli price was most stable in the month of March and most instable in the month of September.

To determine the nature of trend movement in the prices of Chilli in Byadgi market, the data were fitted to up to 6th degree polynomial equation. From table 2, it could be observed that 2nd degree polynomial was found to be the best fit with maximum adjusted R² value (0.772), where both coefficient of linear and quadratic term were found significant at 1 per cent level, followed by 3rd degree polynomial with adjusted R² value 0.754, where both coefficient of linear and quadratic term were found significant at 5 per cent level. Outcome emanated from the study was in line with the findings of the previous studies [4]. Fitted polynomial models were presented graphically in Fig. 1.

Table 1: Descriptive statistics on Chilli prices of Byadgi market (Rs/Qntls)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2003	2550	4200	4733	3729	3440	4533	1403	2100	2000	2350	1767	2050	2905
2004	3653	3876	3183	3467	3132	2790	2567	2483	1733	2917	3014	3816	3053
2005	4287	3677	3277	4767	3467	4000	3326	3514	3372	3484	3582	4111	3739
2006	4752	3469	3102	3307	3857	3551	3871	3456	3736	3899	3837	4882	3810
2007	4376	4299	3446	2132	1856	1629	2067	1770	1723	3619	3286	3719	2827
2008	3740	2569	5436	3367	3130	3617	3217	2733	4819	6064	2849	3783	3777
2009	5069	5946	5442	6199	4969	5236	5376	5609	5349	5486	5849	4269	5400
2010	6519	5902	5245	4269	3636	4969	5736	6092	5812	5979	5772	5313	5437
2011	6493	6204	6070	5604	5221	5710	5816	5890	5889	6225	5953	6003	5923
2012	10645	9014	7779	6934	7774	10054	9555	7004	7655	7479	7854	8808	8380
2013	7499	8335	5698	5230	5009	5251	5002	5214	5630	4956	5505	11138	6206
2014	11648	8870	7953	8010	7056	6805	6934	9154	7639	7405	10454	11523	8621
2015	8799	8955	7779	6656	7100	7255	7504	8254	8250	7805	10010	9249	8135
2016	9654	9424	8255	9000	7985	8145	8835	8060	9484	10305	10614	11219	9248
2017	11500	11504	11905	11505	10754	11285	10760	11100	13509	12904	12874	13053	11888
2018	13644	12292	12110	11760	9800	NA	NA	NA	NA	NA	NA	NA	NA
Mean	7177	6784	6338	5996	5512	5781	5665	5496	5773	6058	6215	6862	6262
Max	13644	12292	12110	11760	10754	11285	10760	11100	13509	12904	12874	13053	11888
Min	2550	2569	3102	2132	1856	1629	1403	1770	1723	2350	1767	2050	2826
Std	3410	3028	2814	2873	2609	2617	2842	2829	3215	2856	3404	3585	2928
CV (%)	48	45	44	48	47	45	50	51	56	47	55	52	47

NA: Not Available

Table 2: Fitted trend equations of Chilli prices for Byadgi market

Fitted Trend	Intercept	β ₁	β ₂	β ₃	β ₄	β ₅	β ₆	Adj. R ²
Linear	1607.4	48.2**	-	-	-	-	-	0.752
2 nd degree Polynomial	2836.7	9.18**	0.002**	-	-	-	-	0.772
3 rd degree Polynomial	3076.9	-5.9*	0.004*	-0.0007	-	-	-	0.754
4 th degree Polynomial	3499.1**	-49.8	1.5*	-0.0009	0.0001	-	-	0.734
5 th degree Polynomial	3450.6	-42.3*	1.2**	-0.005	0.0003	-0.00008	-	0.709
6 th degree Polynomial	2240.4**	214.3*	-12.3	0.002	-0.0008	0.00005	-0.0000001	0.693

*: Significant at 5 per cent level, **: Significant at 1 per cent level β₁, β₂, β₃, β₄, β₅ and β₆ are the coefficients of t, t², t³, t⁴, t⁵ and t⁶, respectively

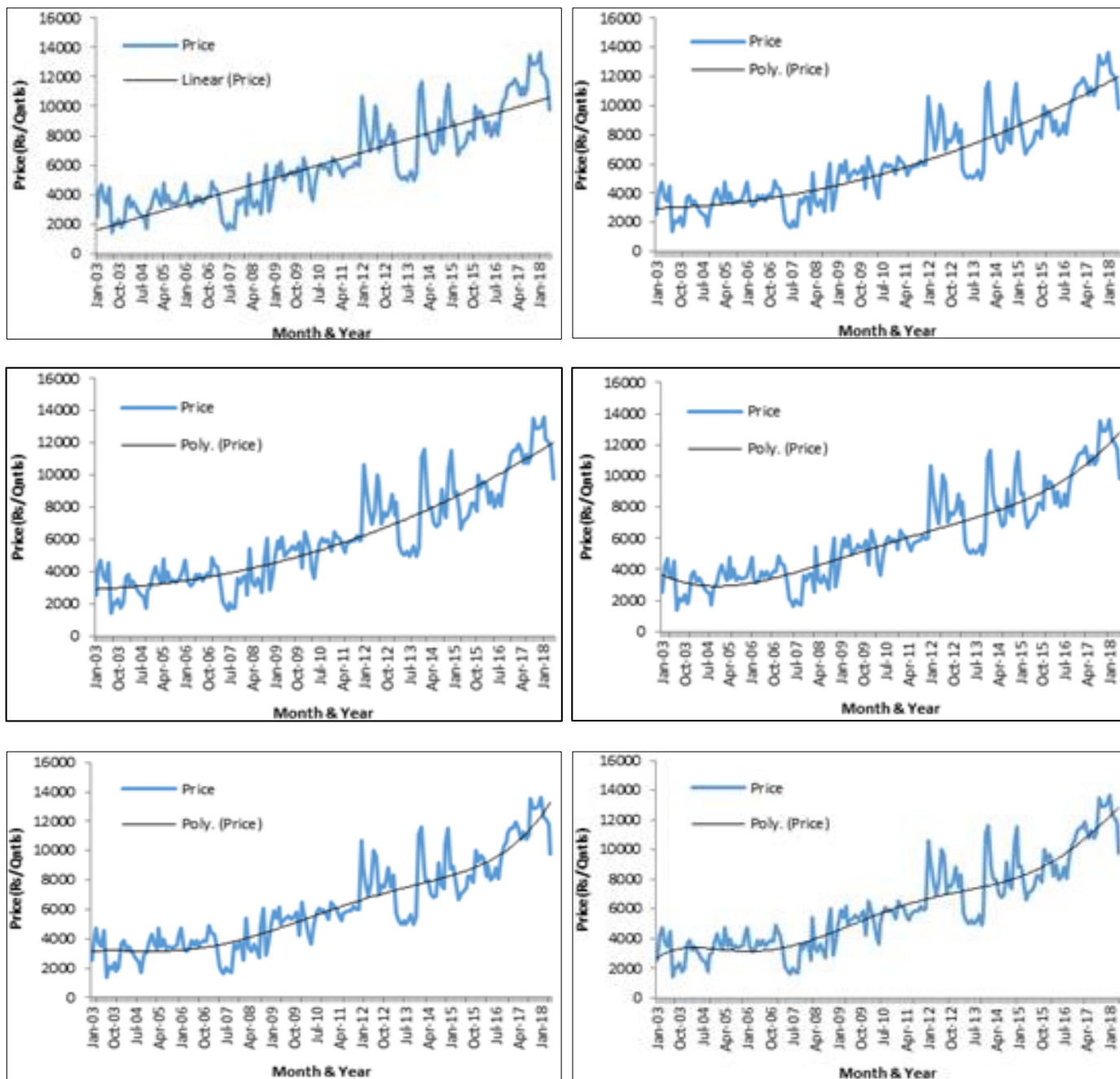


Fig 1: Fitted trend of Linear, 2nd degree, 3rd degree, 4th degree, 5th degree and 6th degree polynomial, respectively

4. Conclusions

The results of the study revealed that the prices of chilli were found to be best fitted with a 2nd degree polynomial was found to be the best fit with maximum adjusted R² value (0.772), where both coefficient of linear and quadratic term were found significant at 1 per cent level. Further, an overall 47 per cent variation in prices was observed in Byadgi market. It was also found that the maximum price recorded to be 13644 Rupees/Quintal during January, 2018 while the minimum price recorded to be 1403 Rupees/Quintal in July, 2003.

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