

# Instability and Decomposition Analysis of Sugarcane Production in All India, Uttar Pradesh and Maharashtra

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## INTRODUCTION

India is known as the original home of sugarcane as its cultivation in the country dates back to the *Vedic* period. At present about 4 million ha of land in India is under sugarcane cultivation with an average productivity level of 70 ton/ha., contributing 7.4 per cent in total agricultural production. Instability in agriculture production is of crucial concern to all stakeholders. First, it affects farmers in terms of income, their ability to harness the next crop, make long term investment and ability to take risk in new technology. It also concerns policy makers as prices of the products tend to fluctuate. One thing that stands out in the growth performance of agriculture since independence is that while sources of growth have changed over time, the overall growth rate of agricultural production has failed to get accelerated <sup>[1]</sup>.

## DECOMPOSITION OF AGRICULTURAL GROWTH

Minhas and Vaidyanathan <sup>[2]</sup> presented a systematic scheme for decomposing the growth trend equating changes in gross agricultural output to changes in four factors. Vidya sagar <sup>[3]</sup> expanded the decomposition into seven components. These approaches are referred to as additive schemes since they decompose absolute growth in the value of output. The additive schemes explicitly contain residual components. An alternative approach called multiplicative scheme, decomposes the relative growth of output into growth rates of components. The first multiplicative scheme was introduced by Dayal <sup>[4]</sup> which does not contain residual terms. Vidya Sagar <sup>[5]</sup> developed his multiplicative scheme as an alternative over Dayal system which follows a consistent pattern of decomposing the index of gross agricultural output. Jamal and Zaman <sup>[6]</sup> worked on a new multiplicative scheme by introducing new indices.

Vaidyanathan and Minhas decomposed agricultural growth for 28 states and 268 districts for the period 1951-54 to 1958-61. They followed additive scheme of decomposition. In each case the observed increase in aggregate output has been decomposed into (a) changes in area, (b) changes in per acre yield, (c) changes in cropping pattern and (d) the interaction between yield and cropping pattern. Contribution of cropping pattern to change in growth of output was found very low.

Based on the above theoretical background on the subject, this paper analyzes instability in sugarcane production for all India and its two highest sugarcane producing states Uttar Pradesh and Maharashtra for the pre-reform and post-reform periods (1958-2017). It measures the growth rate of sugarcane production, area and yield; examines the instability in sugarcane production and uses decomposition analysis of sugarcane production with respect to these three variables.

## RESULTS

The results of the decomposition analysis are presented in the following in **Table 1**.

**Table 1.** Percent contribution of each component in change in variance of production in India, Uttar Pradesh and Maharashtra.

Sources of change	Component change in percent		
	India	Uttar Pradesh	Maharashtra
Change in mean yield	40.35	175.66	1.28
Change in mean area	75.08	335	49.60
Change in yield variance	-25.68	-117	-3.60
Change in area variance	49.64	-12	93.75
Interaction between change in mean yield and mean area	11.30	38	1.07
Change in area yield covariance	-24.63	-155	-16.26
Interaction between change in mean area and yield variance	-38.95	-125	-28.80
Interaction between change in yield and area variance	42.35	-12	10.41
Interaction between change in mean area and yield and changes in area-yield covariance	-28.85	-248	-35.60
Change in residual	-0.61	23	28.12

Computed by the authors.

Area having stabilized in Uttar Pradesh, the change in area variance is negative, variance in production increased considerably, main contribution is of mean area (230 per cent) followed by mean yield (174 per cent). The interaction between mean area and mean yield has also contributed to increase in variance. The variance in yield, the covariance between area and yield and the interaction of variance in yield and mean area, and other factors lead to high variance in production. This is expected since there is considerable increase both in mean area and mean yield. However the mean yield in Uttar Pradesh is lower than Maharashtra by 28 per cent. The reduction in variance in Uttar Pradesh could be seen as stability in production but this stability is at a low level of yield.

### CONCLUSION

It is observed that the decomposition analysis of agricultural growth is conducted by various scholars by taking different components and using different methods of decomposition (additive and multiplicative). But unfortunately, there is no general consensus on the most appropriate measure of decomposition. Though multiplicative scheme of decomposition seems to be a better measure of decomposition than additive as it eliminates the residual component (which did not show significant contribution in any of the studies), it has a problem of indexing of prices and assigning weights to the components.

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