Response of Plant Productivity to Improved Agricultural Markets in India: an Advanced Application of Econometric Cross-Section Time Series Analysis

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Background
Agriculture contributes to the 1/3 of the GDP and retains its immense importance for securing food demand in India for many years to come. This requires new approaches and additional knowledge about the potentials for agricultural growth. Few studies on agricultural productivity conducted so far deal mostly with one-shot surveys attempting to explain the role of agricultural markets. Our study, using longitudinal data, gives new dimensions to analyses uncovering both locational and time effects of markets have on aggregate crop productivity in India.

Objective
Our main objective in this study is to explore, by means of econometric modelling, the effects of market access (expressed through proxies of market density) on aggregate crop productivity in India.

Method
The economic theory of just general profit tells we should get AAP increased we should improve the access to markets. To measure or to describe the market access, we use proxy variables such as road and market densities in respective regions. The bias (under-telers) of the methodology applied in this study will be panel data modeling.

Analysis
We utilise the dataset compiled by joint efforts of ICAR and ICRISAT on 235 districts in 10 states of semi-arid tropics in India for over 29 years from 1966 to 1994.

We utilise the application of cross-sectional time-series FGLS econometric model. This paper examines the rationale behind the evolvement of crop productivity in the time period under question for major part of India (85% of population and 60% of territory covered by the data).

Communalised least squares (GLS) technique performs the best when the errors are heteroskedastic and/or correlated across observations (Stock and Watson, 2003). We run Wooldridge (2002) and Drukker (2003) suggest a test and a routine respectively to test for serial correlation in panel-data models. Applying this test yields,

\[ H_0: \text{no first-order autocorrelation} \]

We observe a highly significant test statistic we need therefore the Pr, hypothesys that the errors in our model have common disturbance variance and that these disturbances are not correlated with the regressors. Our assumption of heteroskedasticity has been thus confirmed, by the above test; so the final model specification will reflect the presence of heteroskedasticity.

Furthermore, we assume the presence of autocorrelation. As iterated GLS with autoregression does not produce the maximum likelihood estimates, we cannot use the likelihood ratio test procedure, as with heteroskedasticity. Wooldridge (2002) and Drukker (2003) suggest a Jarque-Bera (normality) test to test for normality in panel-data models. Applying this test yields,

\[ H_0: \text{no normal distribution} \]

The significant test statistic indicates the presence of serial correlation.

Results
The findings show that the market access determinants have significant effect on crop productivity in the South of India.

- A unit increase of road density (km/km²) will contribute to 0.04 Ruha increase in aggregate crop productivity.
- A unit increase of density of regulated markets (1000/km²) will contribute to 6.01 Ruha increase in aggregate crop productivity.

In the particular region, laps are 3 years.

Conclusions
The results of the study are consistent with the hypothesis that the aggregate crop productivity may be largely improved merely by prompting the states (districts, farmers) to allocate their resources in a more efficient way, without even using more inputs.

It is obvious, however, that increased use of inputs would be adding to the positive effect considerably.

References: