Spring March 11, 2010

The Supply Response of Aggregate Agricultural Output in India

amarnath tripathi
Pre-Ph.D. Seminar

On the Topic

The Supply Response of Aggregate Agricultural Output In India

By

Amarnath Tripathi

Under the Supervision of

Professor A. R. Prasad
The concept of supply response is dynamic and different from supply function which is the static concept. The supply function describes a price quantity relation, where all other factors are held constant. The response relation is more general concept; it shows the change in quantity with changes in prices as well as supply shifters and therefore, approximates to the long run, dynamic concept of supply theory.

1. Introduction
2. An overview of Indian Agriculture
3. Literature Review
4. Theoretical Framework
5. Behaviour of Observing Data
6. Empirical Methodology
7. Results and Discussion
8. Conclusion, Policy Implication and Scope for Further Study
MOTIVATION

Agriculture remains important for overall economic development

Agriculture is struggling with sluggish growth

Supply response at the disaggregated level gives a better explanation since aggregation at the all India level may not capture the variation that could explain the supply response better.

STATEMENT OF PROBLEM

Why is the supply response very weak for Indian agriculture?

How it can be improved?
OBJECTIVE

• To estimate supply elasticities with respect to price and non-price factors.

• To examine whether there is difference in the supply response among highly agricultural based, medium agricultural based, and low agricultural based states.

• To evaluate whether Nerlovian model nested within error correction model.
• The agricultural supply response is price elastic in India.

• The agricultural supply response with respect to non-price factors is more than the price factor.

• Indian agriculture becomes more price responsive during post-reform period in comparison to pre-reform period.

• Nerlove model is nested within Error correction model.

• There is difference in the supply response among highly agricultural based, medium agricultural based and low agricultural based states.
EMPIRICAL METHODOLOGY

MODEL

\[ Y_t = a_0 + a_1 TOT_t + a_2 IRR_t + a_3 TECH_t + a_4 AAR_t + e_t \]

\[ \Delta Y_t = \beta_0 + \beta_1 \Delta TOT_t + \beta_2 \Delta IRR_t + \beta_3 \Delta TECH_t + \beta_4 \Delta AAR_t + \lambda e_{t-1} + \nu_t \]

ESTIMATION PROCEDURE

Unit Root Test → ADF Test

Cointegration Test → Enger Granger Approach

Johansen Approach

DATA BASE AND DATA SOURCES

National Account Statistics
Agricultural Statistics at a Glance
Fertilizer Statistics
Weather Report

Pre-Green Revolution Period
(1950/51- 1965-66)

Full Sample Period
(1950/51 – 2005/06)

Green Revolution Period
(1966/67- 1990/91)

Liberalisation Period
(1991/92-2005-06)

Definition of Variables

\( Y_t \) = Agricultural Output

\( TOT_t \) = Agricultural Terms of Trade

\( TECH_t \) = Technology

\( IRR_t \) = Infrastructure

\( AAN_t \) = Annual Rainfall

PERIOD OF STUDY
1. All variables were found non-stationary for each category.

2. All the series are integrated of order one (first lag difference of each series is stationary).

3. The agricultural output is cointegrated with only irrigation ratio for all India level.

4. The agricultural output is separately cointegrated with irrigation ratio and technology for high, medium, and low agricultural based states, respectively.

5. The impact of agricultural TOT on agricultural output works in combination with non-price factors (technology, irrigation and annual rainfall).

6. Both short-run and long-run supply elasticities with respect to TOT are not statistically significantly different from ‘0’. (Hypothesis 1 is rejected).
7. The results also indicate that elasticities of technology, irrigation ratio, and annual rainfall are positive for both short-and long-run period. (Hypothesis 2 is accepted)

8. Turning to regional level analysis, the short-run and long-run supply elasticities are insignificant for low and high agriculture based states, whereas it is significant and negative for medium agricultural based states (Hypothesis 5 is accepted).

9. The study justified with empirical evidence that Nerlovian model is nested within error correction model (hypothesis 4 is accepted).

10. The study found no significant difference in supply elasticities between pre and post reform periods (Hypothesis 3 is rejected).
CAUSES OF WEAK SUPPLY RESPONSE

Subsistence farming
Lack of infrastructures in rural areas
Restrictions on trade of agricultural products between states
Lack integrated farming approach
Weak agricultural research and extension network
Gradually declining in public investment specially in rural area

POLICY IMPLICATION

A strategy that combines both price and non-price factors is crucial for policies promoting agricultural development. Besides, farmers’ accessibility to output and input markets, strengthening of agricultural research and extension removing restrictions on agricultural trade within country, and improving rural infrastructure especially irrigation, transport, education, and health facilities, are some of the factors that would lead to increase in response.
Certain limitations of this study should be borne in mind. This study relies on a partial equilibrium analysis for the agricultural sector. In the long run, the dynamics of agricultural supply are likely to depend to a large extent on the ability of the sector to attract additional production factors from other sectors, an effect that cannot be captured in a partial equilibrium framework. Despite this, another limitation is that the study covered a short time period especially for state level analysis. To account for the effects of intersectoral factor movements on agricultural supply, an analysis based on dynamic general equilibrium framework would give more meaningful results.