FARM SUPPLY RESPONSE OF PADDY - A CASE STUDY OF
ANDHRA PRADESH

The study of farmers' supply response is of considerable importance for devising a
suitable policy for the agricultural sector of any economy, particularly in India where
agriculture is by far the most important sector in the national economy. For proper planning
and policy formulation it is important to study the behaviour of farmers' attitudes towards
price and non-price variations. The present study is confined to Andhra Pradesh State.
Twelve districts (four from each region) were selected for the purpose of analysis. The main
objective of this study was to examine the relative importance of price, yield, irrigation and
rainfall on the area sown. The study covers the time period 1963-64 to 1983-84. Season
and Crop Reports published by the Bureau of Economics and Statistics, Government of
Andhra Pradesh are the basic sources of data for this study. Nerlovian partial adjustment
model has been adopted to study the farmers' responsiveness.

The Model

\[ X_t = \alpha + \beta_1 P_{t-1} + \beta_2 Y_{t-1} + \beta_3 I_{t-1} + \beta_4 R_t + \beta_5 T + U_t \]

where \((X_t - X_{t-1}) = B(X_t^* - X_{t-1})\).

The final equation of the adjustment model is as follows:

\[ X_t = B(\alpha + \beta_1 P_{t-1} + \beta_2 Y_{t-1} + \beta_3 I_{t-1} + \beta_4 R_t + \beta_5 T) + X_{t-1}(1 - B) + BU_t \]

where

- \(X_t^*\) = standard irrigated area* under paddy in time 't',
- \(X_t\) = actual standard irrigated area under paddy in time 't',
- \(X_{t-1}\) = actual standard irrigated area under paddy in time 't-1',
- \(P_{t-1}\) = relative farm harvest price of paddy,
- \(Y_{t-1}\) = relative yield of paddy,
- \(I_{t-1}\) = total irrigated area under all crops in time 't-1',
- \(R_t\) = three months' average rainfall at the time of sowing period,
- \(T\) = trend variable,
- \(U_t\) = error term, and
- \(B\) = adjustment coefficient.

Acreage elasticities have been calculated for price and non-price variables like relative
yield, irrigation and rainfall to show the relative importance of these variables in influencing
the farmers' allocative behaviour. In this study an attempt has been made to estimate both
short-run and long-run elasticities of price and non-price variables for three regions separa-
tely (i.e., Coastal Andhra, Rayalaseema and Telangana) and Andhra Pradesh as a whole.

<table>
<thead>
<tr>
<th>Short-run price elasticity of acreage</th>
<th>Mean value of the independent variable</th>
<th>Coefficient of price variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Standard irrigated area = Irrigated area + Unirrigated area/2.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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The Model

\[ X_i^* = \alpha + \beta Y_{i1} + \beta Y_{i2} + \beta P_{i1} + \beta P_{i2} + \beta T + U_i \]

where \( X_i^* \) = standard irrigated area\(^\ast\) in paddy in time ‘t’.

\[ X_i = B(\alpha + \beta Y_{i1} + \beta Y_{i2} + \beta P_{i1} + \beta P_{i2} + \beta T + U_i) \]

where \( X_i \) = actual standard irrigated area in paddy in time ‘t’.

The final equation of the adjustment model is as follows:

\[ X_i = B(\alpha + \beta Y_{i1} + \beta Y_{i2} + \beta P_{i1} + \beta P_{i2} + \beta T + U_i) + BU_i \]

where \( X_i \) = actual standard irrigated area in paddy in time ‘t’.

\( X_i \) = actual standard irrigated area in paddy in time ‘t-1’.

\( B \) = relative farm harvest price of paddy,

\( Y_i \) = relative yield of paddy,

\( I_i \) = total irrigated area under all crops in time ‘t-1’.

\( R_i \) = trend variable,

\( U_i \) = error term, and

\( B \) = adjustment coefficient.

Acreage elasticities have been calculated for price and non-price variables like relative yield, irrigation and rainfall to show the relative importance of these variables in influencing the farmers’ allocative behaviour. In this study an attempt has been made to estimate both short-run and long-run elasticities of price and non-price variables for three regions separately (i.e., Coastal Andhra, Rayalaseema and Telangana) and Andhra Pradesh as a whole.

Table I: Acreage Elasticities: Coastal Andhra

<table>
<thead>
<tr>
<th>Name of the district/region</th>
<th>Price elasticity</th>
<th>Yield elasticity</th>
<th>Irrigation elasticity</th>
<th>( R^2 )</th>
<th>B value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Short-run</td>
<td>Long-run</td>
<td>Short-run</td>
<td>Long-run</td>
<td>Short-run</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>East Godavari</td>
<td>0.22</td>
<td>0.37</td>
<td>1.24</td>
<td>2.03</td>
<td>1.65</td>
</tr>
<tr>
<td>West Godavari</td>
<td>0.11</td>
<td>0.21</td>
<td>1.16</td>
<td>2.18</td>
<td>0.90</td>
</tr>
<tr>
<td>Krishna</td>
<td>0.09</td>
<td>0.16</td>
<td>1.38</td>
<td>2.47</td>
<td>0.30</td>
</tr>
<tr>
<td>Guntur</td>
<td>0.23</td>
<td>0.41</td>
<td>0.56</td>
<td>1.00</td>
<td>0.36</td>
</tr>
<tr>
<td>Coastal Andhra region</td>
<td>0.19</td>
<td>0.29</td>
<td>0.48</td>
<td>0.73</td>
<td>0.37</td>
</tr>
</tbody>
</table>

Rayalaseema Region

The elasticities presented in Table II indicate that the price elasticity of acreage is less than rainfall and irrigation elasticity. The short-run and long-run price elasticity of acreage ranged from 0.08 to 0.15 and from 0.15 to 0.21 respectively. Among the four Rayalaseema districts, the price elasticity of acreage in the case of Anantapur is less than the overall price elasticity for the region as a whole. Relative yield variable has no significant influence on acreage under paddy in Rayalaseema region.

Table II: Acreage Elasticities: Rayalaseema

<table>
<thead>
<tr>
<th>Name of the district/region</th>
<th>Price elasticity</th>
<th>Rainfall elasticity</th>
<th>Irrigation elasticity</th>
<th>( R^2 )</th>
<th>B value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Short-run</td>
<td>Long-run</td>
<td>Short-run</td>
<td>Long-run</td>
<td>Short-run</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>Krishna</td>
<td>0.08</td>
<td>0.14</td>
<td>1.22</td>
<td>2.96</td>
<td>0.41</td>
</tr>
<tr>
<td>Guntur</td>
<td>0.09</td>
<td>0.16</td>
<td>1.13</td>
<td>1.06</td>
<td>0.41</td>
</tr>
<tr>
<td>Chittoor</td>
<td>0.11</td>
<td>0.19</td>
<td>0.41</td>
<td>0.60</td>
<td>0.23</td>
</tr>
<tr>
<td>Rayalaseema region</td>
<td>0.12</td>
<td>0.19</td>
<td>0.69</td>
<td>1.08</td>
<td>0.54</td>
</tr>
</tbody>
</table>

\* Standard irrigated area = Irrigated area + Unirrigated area/2.

Long-run price elasticity of acreage = Coefficient of adjustment.

Coastal Andhra Region

Table I shows that the yield and irrigation elasticities are much higher than price elasticity of acreage. Between yield and irrigation, the elasticity of relative yield accounts for a greater amount of change in acreage than irrigation elasticity for Coastal Andhra region as a whole. The short-run price elasticity of acreage ranged from 0.09 to 0.23 whereas the long-run price elasticity ranged from 0.16 to 0.41 for sample Coastal districts. Among the four sample Coastal Andhra districts, the price elasticity of acreage is relatively low for Guntur and low for Krishna. The differences in the magnitude of price elasticity of acreage for Coastal districts present a picture of intra-regional variation with regard to the farmers’ response to price changes. The rainfall variable turned out to be non-significant, suggesting that for Coastal districts rainfall is not an important variable in influencing the extent of area under paddy.

\[ X_i = B(\alpha + \beta Y_{i1} + \beta Y_{i2} + \beta P_{i1} + \beta P_{i2} + \beta T + U_i) + BU_i \]
The rainfall elasticity suggests that this variable caused the maximum proportion of change in the acreage under paddy. To sum up, rainfall and irrigation appear to be significant variables, causing greater influence on the farmers' decision-making process in Rayalaseema region.

**Telangana Region**

Table III shows that the price elasticities fall under low response category as compared to the elasticities of acreage with respect to yield, rainfall and irrigation variables except in the case of Nizamabad where the price elasticity is higher than irrigation elasticity and rainfall elasticity. For Telangana region as a whole, all the four variables are important to explain the variation in the acreage under paddy.

<table>
<thead>
<tr>
<th>Name of the district/region</th>
<th>Price elasticity</th>
<th>Yield elasticity</th>
<th>Rainfall elasticity</th>
<th>Irrigation elasticity</th>
<th>R²</th>
<th>B value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Short-run (2)</td>
<td>Long-run (3)</td>
<td>Short-run (4)</td>
<td>Long-run (5)</td>
<td>(6)</td>
<td>(7)</td>
</tr>
<tr>
<td>Nizamabad</td>
<td>0.28</td>
<td>0.64</td>
<td>0.37</td>
<td>0.83</td>
<td>0.29</td>
<td>0.66</td>
</tr>
<tr>
<td>Nalgonda</td>
<td>0.19</td>
<td>0.29</td>
<td>0.26</td>
<td>0.38</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Khammam</td>
<td>0.33</td>
<td>0.52</td>
<td>0.37</td>
<td>0.59</td>
<td>0.48</td>
<td>0.77</td>
</tr>
<tr>
<td>Karimnagar</td>
<td>0.19</td>
<td>0.33</td>
<td>0.27</td>
<td>0.48</td>
<td>0.56</td>
<td>0.97</td>
</tr>
<tr>
<td>Telangana region</td>
<td>0.24</td>
<td>0.39</td>
<td>0.38</td>
<td>0.64</td>
<td>0.35</td>
<td>0.59</td>
</tr>
<tr>
<td>Andhra Pradesh State</td>
<td>0.20</td>
<td>0.33</td>
<td>0.44</td>
<td>0.72</td>
<td>0.33</td>
<td>0.55</td>
</tr>
</tbody>
</table>

**Andhra Pradesh**

The short-run and long-run price elasticities of acreage as presented in Tables I to III are lower than the short-run and long-run elasticities of yield, rainfall and irrigation among the three regions and Andhra Pradesh as a whole. The price responsiveness appears to be the highest for Telangana and the lowest for Rayalaseema region. The study clearly indicates that the attainment of the desired targets with respect to paddy output may not be possible through the relative price change alone, since the elasticity of relative price variable is not high compared to non-price elasticities. The elasticity estimates clearly explain the relative ineffectiveness of the price variable in influencing the acreage under paddy when compared to the non-price variables like yield and irrigation. These estimates show that the farmers now seem to be more responsive to changes in non-price variables than the price variable in allocating their acreage under paddy.

Thus this study brings out the fact that favourable price policy alone may not induce the farmers to increase paddy output in order to attain the desired targets. In addition to price incentives, non-price incentives like provision of assured irrigation and HYV seeds are equally important which help to increase yields in achieving the targets of paddy output.

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NOTE

1. Short-run price elasticity \[ \frac{\Delta P}{\Delta X} = \frac{P}{X} \times \frac{\Delta X}{\Delta P} \]

Here \[ \frac{\Delta X}{\Delta P} = \text{coefficient of price variable}, \]
\[ P = \text{mean value of price variable}, \]
\[ X = \text{mean value of acreage}. \]

In the case of yield elasticity, it will be \[ \frac{\Delta Y}{\Delta X} = \frac{Y}{X} \times \frac{\Delta X}{\Delta Y} \]

Here \[ \frac{\Delta X}{\Delta Y} = \text{coefficient of yield variable}, \]
\[ Y = \text{mean value of yield variable}. \]

The same procedure has been applied to estimate the rainfall and irrigation elasticities.

REFERENCES


