Market Integration and Price Leadership in the Low Quality Rice Export Market

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Market Integration and Price Leadership in the Low Quality Rice Export Market

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Introduction

Nearly 80 percent of market share in global rice exports are highly concentrated in top five countries (Rice yearbook, 2013). Hence, domestic agricultural and trade policies in these countries typically have profound effects on world rice prices.

Objective

To examine the dynamics of rice export prices and price leadership in the low quality rice sector (i.e., 25% broken rice). We particularly focus on four key exporting countries in the low quality market segment: Thailand, India, Vietnam, and Pakistan.

Data

The data set includes 902 weekly observations of free on board (FOB) prices from January 1996 to April 2013.

Our study divides the data into 4 major cases: (1) Full Sample (Jan. 5, 1996 to April 12, 2013), (2) Subsample 1 (Jan. 5, 1996 to Oct. 5, 2007), (3) Subsample 2 (Oct. 12, 2007 to Sept. 9, 2011), and (4) Subsample 3 (Sept. 16, 2011 to April 12, 2013).

We investigate dynamic price relationships in three specific regimes – from 1996 to 2007 prior to India’s export ban, from late 2007 to 2011 with India out of the market due to the export ban, and from 2011 to 2013 when India re-entered the market and Thailand started their domestic mortgage scheme.

Estimation strategies

1. Unit root tests

- Clemente-Moñes-Reyes tests with structural breaks
- Augmented Dickey-Fuller (ADF) test without breaks

2. Johansen Procedure

Using trace and maximum eigenvalue tests to investigate cointegrating price relationships in both bivariate and multivariate analyses.

3. Vector Autoregressive Model (VAR)

\[ p_t = \eta + A_1 p_{t-1} + A_2 p_{t-2} + \ldots + A_k p_{t-k} + e_t \]

where \( p_t \) is a \( n \times 1 \) vector of price variables, \( \eta \) is a \( n \times 1 \) vector of constant, and \( A_1, \ldots, A_k \) are \( n \times n \) matrices of parameters. \( e_t \) is a \( n \times 1 \) vector of disturbances.

4. Test Hypotheses of price leadership

We test for long-run exclusion (i.e., \( H_0: \beta_k = 0 \)) and weak exogeneity (i.e., \( H_0: \alpha = 0 \)). Goulven (1999) defined price leadership status in accordance to hypothesis tests on the combination of parameter restrictions as follows:

- \( \beta = 0, \alpha = 0 \): price leader
- \( \beta = 0, \alpha \neq 0 \): price follower
- \( \beta \neq 0, \alpha = 0 \): segmented market
- \( \beta \neq 0, \alpha \neq 0 \): regulator market

Main Conclusions

- Vietnam is consistently a price leader in the low quality rice market, while Pakistan and India are the leaders in this market.

Results

I. Bivariate Cointegration

<table>
<thead>
<tr>
<th>Variables</th>
<th>( \hat{\alpha} )</th>
<th>( \hat{\beta} )</th>
<th>( \hat{\gamma} )</th>
<th>( \hat{\delta} )</th>
<th>Constant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full sample</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TH-VT</td>
<td>1.069***</td>
<td>-0.036***</td>
<td>0.036***</td>
<td>0.014</td>
<td></td>
</tr>
<tr>
<td>TH-PK</td>
<td>1.093***</td>
<td>-0.032***</td>
<td>0.024***</td>
<td>0.043</td>
<td></td>
</tr>
<tr>
<td>TH-INDIA</td>
<td>1.069***</td>
<td>-0.0003</td>
<td>0.022</td>
<td>-0.023</td>
<td></td>
</tr>
<tr>
<td>VT-PK</td>
<td>1.093***</td>
<td>-0.030***</td>
<td>0.018</td>
<td>-0.146</td>
<td></td>
</tr>
<tr>
<td>VT-INDIA</td>
<td>1.093***</td>
<td>-0.006</td>
<td>0.019</td>
<td>-1.662</td>
<td></td>
</tr>
<tr>
<td>PAK-INDIA</td>
<td>1.081***</td>
<td>-0.004</td>
<td>0.023***</td>
<td>-0.959</td>
<td></td>
</tr>
<tr>
<td>Subsample 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAK-INDIA</td>
<td>1.081***</td>
<td>-0.005</td>
<td>-0.163***</td>
<td>-43.147</td>
<td></td>
</tr>
</tbody>
</table>

Note: ***, **, * denotes significance at 1%, 5% and 10% level

II. Multivariate Cointegration

In the multivariate analysis, we find that Indian low quality rice prices are cointegrated with low quality rice prices of Thailand, Vietnam, and Pakistan.

III. Market price leadership Analysis

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>HYPOTHESES</th>
<th>THAI</th>
<th>VIETNAM</th>
<th>PAKISTAN</th>
<th>INDIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-run exclusion</td>
<td>2.669</td>
<td>31.24***</td>
<td>11.42***</td>
<td>2.742***</td>
<td></td>
</tr>
<tr>
<td>Weak exogeneity</td>
<td>2.51</td>
<td>2.88**</td>
<td>0.73</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td>Weak Price leader status</td>
<td>34.5**</td>
<td>54.52***</td>
<td>22.99***</td>
<td>6.736***</td>
<td></td>
</tr>
<tr>
<td>Weak long-run exclusion</td>
<td>11.51***</td>
<td>7.14***</td>
<td>5.88</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>Price leader status</td>
<td>16.72***</td>
<td>46.5***</td>
<td>29.01***</td>
<td>5.352***</td>
<td></td>
</tr>
<tr>
<td>Weak exogeneity</td>
<td>2.80</td>
<td>7.54***</td>
<td>1.81</td>
<td>0.23</td>
<td></td>
</tr>
<tr>
<td>Price leader status</td>
<td>16.72***</td>
<td>46.5***</td>
<td>29.01***</td>
<td>5.352***</td>
<td></td>
</tr>
</tbody>
</table>

Note: ***, **, * denotes significance at 1%, 5% and 10% level

We provide the following insights:

- India has been a price leader in the market for 25% broken rice for over 17 years.
- Thailand is likely a segmented market in the 1996 to 2013 period.
- Thailand has emerged as a new price leader together with Pakistan and India since late 2011.