Thresholds in rice markets
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A Threshold Vector Error Correction Model

A TVCM captures the dynamics of the non-linear adjustment process. This non-linearity has important implications for policy analysis, because it changes the timing and magnitude of price responses estimated under linear assumptions (Meyer and von Cramon-Taubadel, 2004).

A two-regime one threshold TVCM can be represented as follows,

\[ \Delta P = \begin{cases} \alpha_1 + \sum_i \beta_{i1} \Delta P_{t-1} + \gamma_i \Delta P_{t-2} + \varepsilon_t, & \text{if } y_{2,t} \leq c \\ \alpha_2 + \sum_i \beta_{i2} \Delta P_{t-1} + \gamma_i \Delta P_{t-2} + \theta (y_{2,t} - c) \varepsilon_t, & \text{if } y_{2,t} > c \end{cases} \tag{ECT} \]

where \( y_{2,t} \) is the vector of prices being analyzed, \( \Delta P_{t-1} \) is the adjustment parameter, and \( \varepsilon_t \) is the threshold parameter. The ECT contains the long-run cointegrating relationship between two prices and is estimated as \( 1 - e_{t-1} = (\rho_1 - \rho_2) \varepsilon_{t-1} \).

There is greater evidence for threshold cointegration than there is for linear cointegration.

- Higher prevalence of cointegration using international prices as the world price.
- Average threshold is estimated at \( -0.298 \), equivalent to about 331 bps price differential, calculated at the mean export price of Viet25\%.
- Threshold values are much lower for countries in Asia and for rice exporters. Thresholds are calculated at the mean export price of Viet25\%.
- There is a decline in the PT parameters after the food crisis.

The empirical analysis is based on logarithmic transformations of the prices. Standard unit-root tests confirm the presence of unit roots in levels and stationarity in first differences.

### RESULTS

#### Prevalence of threshold cointegration

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<thead>
<tr>
<th>Region</th>
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See the supplementary file for detailed data on the prevalence of threshold cointegration.

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The results indicate that trade barriers are frequently used as a buffer against domestic or international shocks in rice prices, rather than using trade as a source of cheaper imports or an opportunity for export earnings (Anderson, 2009). In many cases, we observe that there is an effort, often successful, to restrict arbitrage and PT when the price difference expands. We find support for strong negative correlation between government intervention and the speed of adjustment.

### POLICY AND PRICE TRANSMISSION

- Threshold models suggest much faster adjustments in response to price disequilibrium than is the case when threshold effects are ignored.
- There is a decline in the PT parameters after the food crisis.
- Higher income countries, perhaps because they have the capacity to implement policy interventions in rice trade, are related with slower adjustment. The slowest price adjustment is observed in countries from income group 2.
- The PT behavior of exporters and importers differed in response to deviations in price disequilibrium. While exporters are able to quickly respond to deviations in equilibrium, the results indicate that in importing countries spatial arbitrage opportunities are restricted.
- The adjustment parameters are larger in magnitude in regime 1 than in regime 2 in many cases. However, this is not aligned with spatial equilibrium theory. The violation is even more evident after the food crisis.

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