Dynamic Impacts of Export Controls on Price Transmission

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Outline

- Background
- Research Questions and the Objective
- Data and Empirical Strategy
- Results and Conclusions
Monthly Real Food Price Indices
(2002-04=100)

Data source: FAO 2012
First quota: Oct 06 – Jun 07
Second quota: Jul 07 – Jul 08
Third quota: Oct 10 – Jun 11
• How does the export control affect the domestic wheat market
  ◦ Long run price equilibrium with the world, if any
  ◦ Short run adjustment/movement

• Is export control an effective tool to help the domestic food consumers
  ◦ Stabilize the market and reduce the food price

• Something more
  ◦ Volatility of the adjustment
  ◦ Dynamic price transmission coefficient/elasticity

• Objective of this study
  ◦ Develop a generalized procedure for empirical study of price transmission

Research Questions
Ukrainian Wheat and World Market Wheat Prices
Ukrainian Wheat and Flour Prices
We investigate two pair-wise price linkages
- Ukrainian and world wheat markets (Spatial)
- Ukrainian wheat and wheat-flour markets (Vertical)

For each pair, we examine
1. Long-run price equilibrium
2. Short-run price adjustment
   • Standard error correction models (EMDs)
   • Plus ARCH/GARCH
3. Dynamic transmission coefficient/elasticity
   • Copula approach (Patton 2006, 2012)
Copula explores the complete dependence structure of two or more random variables

Attractive features

° Copula representations of dependence are free of the linear restriction
° Copulas enable us to model marginal distributions and the dependence structure separately
° Time-varying copulas allow us to reveal the dynamic co-movement paths of the random variables
Weekly price data
- Cover January 2005 - December 2011
- Ukrainian wheat and wheat flour price data are obtained from APK-Inform
- The relevant world market price for Ukraine are represented by the FOB price of wheat in Rouen, France
Cointegration tests indicate one LR equilibrium for each pair

- Ukraine and the world
  \[ \hat{p}_t^{UKR} = 1.18 + 0.75p^{WORLD}_t \]

- Wheat and wheat flour
  \[ \hat{p}_t^{FLOUR} = 1.43 + 0.81p^{WHEAT}_t \]
• Ukraine and the world

\[ \Delta \hat{p}_t^{UKR} = 0.08 - 0.07z_{t-1} + 0.40\Delta \hat{p}_{t-1}^{UKR} + 0.09\Delta p_{t-2}^{WORLD} \]
\[ \Delta \hat{p}_t^{WORLD} = 0.0005z_{t-1} + 0.16 \Delta p_{t-1}^{WORLD} \]

• Wheat and wheat flour

\[ \Delta \hat{p}_t^{FLOUR} = 0.09 - 0.06z_{t-1} + 0.29\Delta \hat{p}_{t-1}^{FLOUR} + 0.22\Delta p_{t-2}^{WHEAT} \]
\[ \Delta \hat{p}_t^{WHEAT} = 0.01z_{t-1} + 0.29\Delta \hat{p}_{t-1}^{FLOUR} + 0.37\Delta p_{t-1}^{WHEAT} \]

Note: Statistically insignificant regressors (\( \alpha = 0.05 \)) are excluded.
• UKR: GARCH (1,1); World: GARCH(1,1)
• Wheat: GARCH (1,1); Flour: ARCH (1)

Volatility-Wheat and Flour
\[ \Delta p_t^U | I_{t-1} = \beta_t \Delta p_t^W | I_{t-1}, \text{ and } \beta_t = \rho_t \frac{\sigma_U}{\sigma_W} \]

**Dynamic Transmission Elasticity: UKR & World**
Dynamic Transmission Elasticity: Wheat & Flour
• **Conclusions**

  - We propose a procedure to empirically investigate dynamic price transmission
    - Conventional practice
      - long-run transmission coefficient
      - short-run adjustment
      - Volatility
    - Copula
      - Dynamic transmission elasticity/coefficient
      - ...

  - Copula is a useful extension and generalization of conventional dependence modeling approaches for investigating price transmission and market co-adjustments
Apply copula approach to the price transmission case

\[ \Delta p_t^1 = \mu_1 + \sigma_1 \varepsilon_1 \]
\[ = \sum \alpha_1 \Delta \hat{p}_{t-i}^1 + \sum \beta_1 \Delta \hat{p}_{t-j}^2 + \gamma_1 z_{t-1} + \sigma_1 \varepsilon_1 \]
\[ = \sum \alpha_2 \Delta \hat{p}_{t-i}^1 + \sum \beta_2 \Delta \hat{p}_{t-j}^2 + \gamma_2 z_{t-1} + \sigma_2 \varepsilon_2 \]

Dependence structure between \( \Delta p_t^1 \mid I_{t-1} \) and \( \Delta p_t^2 \mid I_{t-1} \) is equivalent to the dependence structure of the standardized residuals

\[ \varepsilon_1 = (\Delta \hat{p}_t^1 - \mu_1)/\sigma_1 \text{ and } \varepsilon_2 = (\Delta \hat{p}_t^2 - \mu_2)/\sigma_2 \]