The development of the Ukrainian farm wheat price volatility: Evidence from a dynamic conditional correlation GARCH model

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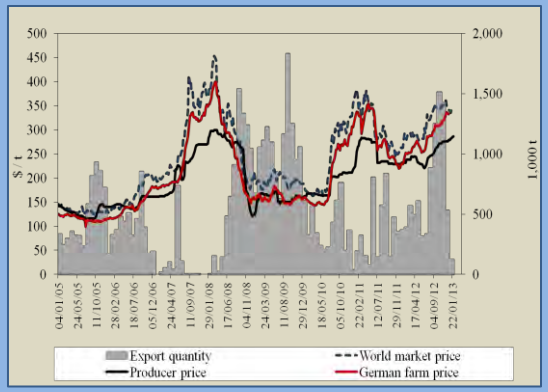
Introduction

During the recent commodity price booms on world markets (2007/2008 and 2010/2011), Ukraine and Russia, two large grain exporters, heavily intervened into their wheat markets with a number of export restrictions, including bans, quotas and tariffs.

These trade interventions aimed to stabilize prices on the domestic market by preventing the transmission of dramatically increasing and volatile world market prices.

This paper aims to analyze whether such efforts were successful in decreasing price volatility in the Ukrainian domestic wheat market.

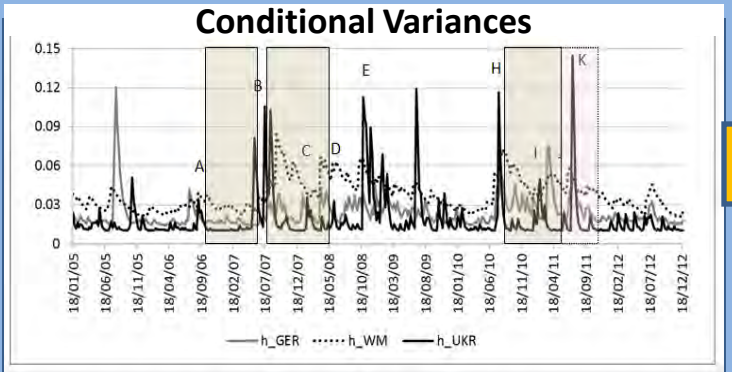


Research Objectives

1) To investigate the development of the Ukrainian wheat farm price volatility during the export interventions compared to open trade.

2) To study interdependence of the world (French) and Ukrainian domestic wheat price volatility in the analyzed period.

Conditional Variances



Methods

- In our analysis we employ a DCC-GARCH model (Engle, 2002).
- It approximates a dynamics conditional correlation matrix and permits to evaluate whether the level of interdependence between markets has changed across time $H_t = D_t R_t D_t$

- H_t is the conditional covariance matrix of the price returns vector.

- R_t is the $k \times k$ time varying correlation matrix and D_t is a $k \times k$ diagonal matrix of conditional variances, obtained from the univariate GARCH models.

- This is estimated in two steps. First, the volatility components in D are estimated. The second step maximizes the components in R conditional on the estimates from the first step, using the following equation:

$$R_t = (1-\alpha-\beta)\bar{R} + \alpha\varepsilon_{t-1}\varepsilon_{t-1}^{'} + \beta R_{t-1}$$

	France	Ukraine	Germany
Volatility equations (univariate GARCH)			
α_0	-0.00 (0.95)	-0.00 (0.75)	0.00 (0.91)
α_1	0.14 (0.02)**	0.74 (0.00)***	0.37 (0.01)**
β_1	0.83 (0.00)***	0.25 (0.00)***	0.56 (0.00)***
$\alpha_1 + \beta_1$	0.97	0.99	0.93
Log Likelihood	809	1270	1041

Chronology of market disruptions

A: In September 2006 the Ukrainian government announces the introduction of export quotas in October 2006, but the size of the quota remains unclear; market experts talk a lot about this in the media.
B: The export quota is lifted on some grains in May 2007; the export quota is reintroduced on July 1, 2007 in light of a severe drought.
C: The Ukrainian government announces the increase in the size of the export quota on February 4, 2008 but this is not realized.
D: Export quotas for wheat are cancelled in May 2008.
E: Towards the end of 2008, the GASC (governmental import company of Egypt) complains about quality issues regarding wheat originating in Ukraine and removes wheat originating in Ukraine from its tender list.
H: Russia introduces a wheat export ban at the beginning of August 2008. Same month Ukraine imposes export quota.
I: The Ukrainian government announces the extension of the wheat export quota until the end of June 2011.
J: On June 10, the Ukrainian president signs a law to introduce a wheat export tax on July 1.
K: Towards the end of July, the GASC announces that it considers allowing wheat originating in Ukraine to be included in the next wheat tender (after it has been off the list for 3 years).

Conclusions

1) Spikes in the Ukrainian wheat farm price volatility coincide with (and are possibly caused by) one of the following factors:
- Actual change in export policy
- Change in policy environment
- Speculations about such a change

2) Unlike Germany and France, Ukrainian domestic price volatilities are sensitive to the external shocks (domestic policy).
3) Ukraine exhibits the highest variation in price volatility compared to the other analyzed series.
4) The correlation between Ukrainian and French wheat prices is low (0.05).

References

Robert Engle (2002): Dynamic Conditional Correlation, Journal of Business & Economic Statistics, 20:3, 339-350