How effective are export restrictions in Kazakhstan, Russia and Ukraine? Evidence from price transmission analyses

Linde Götz and Ivan Djuric

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Large Former Soviet Union Grain Producers

Commonwealth of Independent States

Leibniz Institute of Agricultural Development in Central and Eastern Europe
Large grain production potential KRU

Sources: 1) increase production efficiency;
2) recultivate formerly abandoned land
Importance for global food security

- Global demand for cereals will reach 3 billion tons by 2050
- Global grain production needs to increase by 30% (OECD/FAO 2012)
- The KRU’s share in world wheat exports amounts over 20% already today with about 35 million t

→ If the grain production potential can be mobilized depends on their agricultural policies
Export controls in the KRU

Kazakhstan
- Export ban 2008

Russia
- Export tax 2007-08
- Export ban 2010-11

Ukraine
- Export quota 2006-07
- Export quota 2007-08
- Export quota 2010-11

Graphs showing changes in export quantities, world market prices, and producer prices for wheat in Kazakhstan, Russia, and Ukraine, with specific interventions marked (e.g., export ban 2008, export tax 2007-08, export ban 2010-11, export quota 2006-07, export quota 2007-08, export quota 2010-11).
Export restrictions & WTO

• Article XI of the GATT 1994 requires Members to eliminate all prohibitions and quantitative restrictions on exports:

<table>
<thead>
<tr>
<th>export tax</th>
<th>export quota</th>
<th>export ban</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

• Exceptions: „the prohibition on export restrictions does not extend to restrictions temporarily applied to prevent or relieve critical shortages of foodstuffs or other products essential to the exporting contracting party“
Research questions & approach

• How did export controls effect domestic wheat prices in the KRU?

• Are there differences in those effects between the KRU countries and how can they be explained?
  → Develop indicators for the effectiveness of export controls
  → Utilize a price transmission model approach:
    price relationship domestic price – world market price
Export controls in the KRU: Ukraine

![Graph showing export controls in the KRU: Ukraine]
Economics of export controls: Domestic supply effect

**Introduction**

**Trade Policies & Effects**

**Method & Results**

**Conclusions**

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**Domestic market**

- Supply schedule: $S_{QA}^d$ and $S^d$

- Demand curve: $D$

- Price: $p^c$

- Quantity: $q^d$

- Domestic supply: $QA = q_x$

**World market**

- Supply schedule: $S_{QA}^w$

- Demand curve: $D$

- Price: $p^w$

- Quantity: $q^w$

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**Key Points**

1. Export supply effect
2. Import demand effect
3. Domestic supply effect
4. Domestic demand effect
5. Total supply effect
6. Total demand effect
Feedback price effect on the world market
• Export restrictions & world market price effects
  e.g. Anderson and Nelgen 2012; Giordani & Rocha 2012;
  Martin and Anderson 2012, Headey 2011

• Export restrictions & domestic price effects
  e.g. Baylis et al. 2014; Djuric et al. *forthcoming*, Diao et al. 2013,
  Götz et al. 2013a, 2013b, Goychuk and Meyers 2013,
  and von Cramon 2008
Model approach & research hypotheses

- Regime switching long-run equilibrium model

\[
p_t^d = \begin{cases} 
  \alpha^f + \beta^f \cdot p_{t}^{wm} + u_t^f & \text{(free trade regime)} \\
  \alpha^r + \beta^r \cdot p_{t}^{wm} + u_t^r & \text{(restricted trade regime)}
\end{cases}
\]

- \( p_t^d \) = domestic price
- \( p_t^{wm} \) = world market price
Model approach & research hypotheses

- Regime switching long-run equilibrium model

\[
p_t^d = \begin{cases} 
\alpha^f + \beta^f \cdot p_{wm}^t + u_t^f & \text{(free trade regime)} \\
\alpha^r + \beta^r \cdot p_{wm}^t + u_t^r & \text{(restricted trade regime)} 
\end{cases}
\]

- Domestic supply effect
  Price margin effect = \( \alpha^r - \alpha^f \)

Hypothesis: price margin increases
Model approach & research hypotheses

- **Regime switching long-run equilibrium model**
  \[
  p^d_t = \begin{cases} 
  \alpha^f + \beta^f * p^{wm}_t + u^f_t & \text{(free trade regime)} \\
  \alpha^r + \beta^r * p^{wm}_t + u^r_t & \text{(restricted trade regime)}
  \end{cases}
  \]

- **Domestic supply effect**
  Price margin effect = \( \alpha^r - \alpha^f \)
  Hypothesis: price margin increases

- **Price insulating effect**
  Change in long-run pt = \( \frac{\beta^f - \beta^r}{\beta^f} * 100 \)
  Hypothesis: long-run pt decreases
Indicators for export controls’ effectiveness

- **Domestic supply effect**

  1) Price margin effect = \( \alpha^r - \alpha^f \)

  2) Price level effect = \( \frac{\sum_{tf=1}^{n} (p_{tf}^{wm} - p_{tf}^{d})}{p_{tf}^{d}} / n \) - \( \frac{\sum_{tr=1}^{m} (p_{tr}^{wm} - p_{tr}^{d})}{p_{tr}^{d}} / m \)

     Avg. price diff. free trade     Avg. price diff. export restriction

- **Price insulating effect**

  3) Change in long-run pt = \( \frac{\beta^f - \beta^r}{\beta^f} \times 100 \)
Domestic wheat prices

• Russia (regional), Ukraine (national average): wheat class III, EXW prices, weekly, 2005-2012 (417 obsv.)
• Kazakhstan (regional) wheat producer prices, monthly, 2005-2012 (96 obsv.)

World market prices

• Rouen port, France, FOB soft wheat class 1, weekly, 2005-2012 (417 obsv.)

Data sources: APK-Inform, Statistical offices Russia, Kazakhstan, HCGA
• Price series **nonstationary**, integrated of order 1
• Domestic price series **cointegrated** with the world market price
• **Granger causality test** (Toda-Yamamoto procedure): World market prices cause domestic prices in the majority of the cases
• Parameter estimates obtained from **Johansen’s procedure** and **unrestricted error correction model** not interpretable economically
• Parameter estimates obtained from **OLS** reasonable for all cases, but suffers from **spurious regression** (DW<R^2)
Export quota Ukraine

EXQ 6/7  EXQ 7/8  EXQ 10/11

- Export quantity
- World market price
- Producer price
- Export quota
### Export quota Ukraine: Indicators effectiveness

<table>
<thead>
<tr>
<th></th>
<th>quota 2006/7</th>
<th>quota 2007/8</th>
<th>quota 2010/11</th>
<th>average</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Price insulating effect</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in %</td>
<td>-44%</td>
<td>-39%</td>
<td>-10%</td>
<td>-31%</td>
</tr>
<tr>
<td><strong>2. Price damping effect</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) price margin</td>
<td>2.36</td>
<td>2.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) price level</td>
<td>-11%</td>
<td>-20%</td>
<td>-23%</td>
<td>-18%</td>
</tr>
</tbody>
</table>
Russia - Regional wheat prices

Export tax

Export ban

Wheat export
Flour export
World market price
North Caucasus
Ural
Central Russia
Black Earth
Volga
West Siberia
Russia - Export ban effects (1)
Russia – Export ban effects (2)

Export ban

<table>
<thead>
<tr>
<th></th>
<th>Jan-07</th>
<th>Sep-07</th>
<th>Mar-08</th>
<th>Sep-08</th>
<th>Mar-09</th>
<th>Sep-09</th>
<th>Mar-10</th>
<th>Sep-10</th>
<th>Mar-11</th>
<th>Sep-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCaucasus-Volga (flows)</td>
<td>5000</td>
<td>10000</td>
<td>15000</td>
<td>20000</td>
<td>25000</td>
<td>30000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volga-NCaucasus (flows)</td>
<td>0</td>
<td>5000</td>
<td>10000</td>
<td>15000</td>
<td>20000</td>
<td>25000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Trade direction change

Price (Roubles/ton)

- NCaucasus-Volga (flows)
- Volga-NCaucasus (flows)
- North Cauc.
- Volga

Legend:
- Wheat export
- Flour export
- World market price
- North Caucasus
- Volga

Graphs showing trade policies and effects of an export ban on the NCaucasus-Volga and Volga-NCaucasus trade directions, with price fluctuations over time.
## Regional trade during export ban

<table>
<thead>
<tr>
<th>from...</th>
<th>North Caucasus, in t</th>
<th>West Siberia, in t</th>
<th>Black Earth</th>
<th>Central, 1.2 million</th>
<th>Volga, 453,936</th>
<th>Ural, 300,910</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Caucasus, in t</td>
<td>-2.5 million</td>
<td>-1.18 million</td>
<td>534,336</td>
<td>1.2 million</td>
<td>453,936</td>
<td>300,910</td>
</tr>
<tr>
<td>West Siberia, in t</td>
<td>1.18 million</td>
<td>73,107</td>
<td>555,380</td>
<td>1.31 million</td>
<td>101,444</td>
<td>1 million</td>
</tr>
<tr>
<td>Total imports</td>
<td>534,336</td>
<td>73,107</td>
<td>555,380</td>
<td>1.31 million</td>
<td>101,444</td>
<td>1 million</td>
</tr>
</tbody>
</table>
# Export ban Russia: Indicators effectiveness

<table>
<thead>
<tr>
<th></th>
<th>North Caucasus</th>
<th>Central</th>
<th>Black Earth</th>
<th>Volga</th>
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<td><strong>1. Price insulating effect</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In %</td>
<td>-61%</td>
<td>-37%</td>
<td>-30%</td>
<td>-21%</td>
<td>+20%</td>
<td>+11%</td>
</tr>
<tr>
<td><strong>2. Price damping effect</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) price margin</td>
<td>5.25</td>
<td>3</td>
<td>2.44</td>
<td>-</td>
<td>-</td>
<td>-0.84</td>
</tr>
<tr>
<td>b) price level</td>
<td>-42%</td>
<td>-17%</td>
<td>-15%</td>
<td>-12%</td>
<td>-13%</td>
<td>+4%</td>
</tr>
</tbody>
</table>
Regional wheat prices Kazakhstan

Export ban

- **Flour exports**
- **Wheat exports**
- **World market price**
- **South Kazakhstan**
- **North Kazakhstan**
- **Pavlodar**
- **Almaty**
- **Kostanay**
- **Aktobe**
- **East Kazakhstan**
- **Akmola**
Reasons for increasing prices the export ban

- Market intransparent: Wrong info on the size of the harvest 2007/8
- Scarcity of wheat on the domestic market
- Increased domestic demand for wheat for flour export
- Bad harvest expectations for Eastern Kazakhstan 2008/9
### Effectiveness of export restrictions KRU

<table>
<thead>
<tr>
<th>Effective export restrictions</th>
<th>Kazakhstan</th>
<th>Russia</th>
<th>Ukraine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rather no effectiveness</td>
<td>ET: rather low effectiveness</td>
<td>EB: effectiveness varies strongly between regions</td>
<td>medium effectiveness; differences between the quota systems small</td>
</tr>
</tbody>
</table>
Export ban Russia: Bread price effect

<table>
<thead>
<tr>
<th></th>
<th>North Caucasus</th>
<th>Central</th>
<th>Black Earth</th>
<th>Volga</th>
<th>West Siberia</th>
<th>Ural</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Price insulating effect</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>In %</td>
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<td>-37%</td>
<td>-30%</td>
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<td>-</td>
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<td>b) price level</td>
<td>-42%</td>
<td><strong>-17%</strong></td>
<td>-15%</td>
<td>-12%</td>
<td>-13%</td>
<td><strong>+4%</strong></td>
</tr>
</tbody>
</table>

Bread price is damped by 3% in Moskow
High economic costs of export restrictions

In the short-run:

• Economic losses for farmers & traders
• Increased market and price risk
• Further increasing the world market price level

In the medium-run and long-run:

• Disincentives for investments in the grain sector
• The uncertain and unpredictable market conditions prevent the further development of the grain sectors
  → Grain production potential can not fully be mobilized
  → Negatively affects global food security
Policy alternatives: What should be done?

- Avoid trade-oriented measures
- Let domestic food prices go up (e.g. Russia in 2013)
- Help poor consumers to cope with high food prices (consumer-oriented measures)
This work was financially supported by the German Federal Ministry of Food and Agriculture through the Federal Office for Agriculture and Food.

Thank you very much for your attention!
## Grain stocks Russia

<table>
<thead>
<tr>
<th>Region</th>
<th>Grain stocks June 2011</th>
<th>Grain stocks June 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Caucasus</td>
<td>1384</td>
<td>739</td>
</tr>
<tr>
<td>Southern</td>
<td>3992</td>
<td>2173</td>
</tr>
<tr>
<td>Central</td>
<td>3779</td>
<td>2838</td>
</tr>
<tr>
<td>Volga</td>
<td>3865</td>
<td>4750</td>
</tr>
<tr>
<td>Ural</td>
<td>1280</td>
<td>1795</td>
</tr>
<tr>
<td>West Siberia</td>
<td>3984</td>
<td>3918</td>
</tr>
<tr>
<td>Northwestern</td>
<td>639</td>
<td>406</td>
</tr>
<tr>
<td>Far Eastern</td>
<td>55</td>
<td>128</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18978</strong></td>
<td><strong>16747</strong></td>
</tr>
</tbody>
</table>
# Share wheat exports in production

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>22%</td>
<td>25%</td>
</tr>
<tr>
<td>Kaz</td>
<td>36%</td>
<td>36%</td>
</tr>
<tr>
<td>Ukraine</td>
<td>27%</td>
<td>34%</td>
</tr>
</tbody>
</table>
Outlook

• Correct standard errors of the long-run equilibrium parameters
  – Test significance of estimated parameters

• Differences export quota systems Ukraine

• Include Memorandum of understanding Ukraine

• Reasons for ineffectiveness of the export ban in Kazakhstan
Which estimator should be used?


- Abeysinghe and Boon (1999) „The only method which produced reasonably looking ...estimates across all categories was the OLS“
Estimating long-run equilibrium relationships

\[
P_t^d = \begin{cases} 
\alpha^f + \beta^f \cdot p_{t}^{wm} + u_t^f & \text{(free trade regime)} \\
\alpha^r + \beta^r \cdot p_{t}^{wm} + u_t^r & \text{(restricted trade regime)} 
\end{cases}
\]

1. Ordinary least squares (requires stationary data)
2. Unrestricted error correction model
3. Johansen’s maximum likelihood estimator (Johansen and Juselius 1990)
4. OLS plus standard error correction (e.g. Engle and Yoo 1991, Park and Phillipps 1988, Phillips and Hansen 1990)
5. OLS regression augmented by dynamic components as lags & differences (e.g. Hamilton 1994, Phillips and Loretan 1991)
# Price transmission free trade regime Kazakhstan

<table>
<thead>
<tr>
<th></th>
<th>South K.</th>
<th>North K.</th>
<th>East K.</th>
<th>Pavlodar</th>
<th>Almaty</th>
<th>Akmola</th>
<th>Kostanay</th>
<th>Aktobe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>intercept</strong></td>
<td>1.628***</td>
<td>0.605***</td>
<td>0.974***</td>
<td>1.133***</td>
<td>0.972***</td>
<td>0.879***</td>
<td>0.558***</td>
<td>1.884***</td>
</tr>
<tr>
<td><strong>slope</strong></td>
<td>0.420***</td>
<td>0.669***</td>
<td>0.579***</td>
<td>0.540***</td>
<td>0.591***</td>
<td>0.600***</td>
<td>0.720***</td>
<td>0.330***</td>
</tr>
</tbody>
</table>

Long-run price equilibrium free trade regime (89 obs.)

RAUS???