Productivity and profitability developments in Ukrainian agriculture: Agroholding versus independent enterprises

Igor Ostapchuk
Alfons Balmann
Jarmila Curtiss

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Ukrainian agriculture before the crisis

- Strong increase in land bank of agroholdings

Source: AGRI_SURVEY (2013)
Ukrainian agriculture before the crisis

- Strong increase in land bank of agroholdings
- Significant investments of agroholdings
  - in modernization of production technologies
  - in livestock production
  - in infrastructure

Crop farming

- Agricultural holdings: 45.0%
- Independent enterprises: 36.3%
- Private households: 18.7%

Animal farming

- Agricultural holdings: 58.2%
- Independent enterprises: 24.8%
- Private households: 17.0%

Source: AGRISURVEY (2013)
Ukrainian agriculture before the crisis
Ukrainian agriculture before the crisis

- Strong increase in land bank of agroholdings
- Significant investments of agroholdings
- Positive yield trends

Yield development in Ukraine

Source: USDA
Ukrainian agriculture before the crisis

- Strong increase in land bank of agroholdings
- Significant investments of agroholdings
- Positive yield trends
- Growth of agroholdings financed by
  - lendings of (international) banks and financial institutions
  - placement of Euro bonds
  - IPOs

➤ Relatively high indebtedness of agroholdings!
➤ Booming prices for land and acquisitions!
Ukrainian agriculture since the crisis

• Political crisis
  ➢ Political uncertainty
  ➢ Inflation
  ➢ Increasing interest rates
  ➢ Decreasing availability of loans (nationally and internationally)
Ukrainian agriculture since the crisis

- Political crisis
- Decreasing international food prices

![Development of corn prices since 2000](chart.png)
Ukrainian agriculture since the crisis

- Political crisis
- Decreasing international food prices
- Decreasing share prices of agroholdings!
Ukrainian agriculture in 2014

- Political crisis
- Decreasing international food prices
  - Decreasing share prices of agroholdings!
  - Increasing number of struggling agroholdings!

- Why are agroholdings so affected?
Ukrainian agriculture since the crisis

Why are agroholdings so affected?

• Booming agricultural prices and yields caused a kind of "gold rush"
  – Enormous competition for growth opportunities caused high prices for land and acquisitions!
  – Fast growth requires enormous financial means! (not only in the short run, but also in the long run -> short-term lending)
  – Growth causes adjustment costs! (i.e. the returns can only be expected in the long run)
  – Significant productivity deficits were not resolved!

➢ Is this really surprising?
Views of agroholding managers (2012)

How important do you assess the following strategies?

- Expansion and growth
- Internationalization
- Diversification
- Specialization
- Consolidation
- Efficient production
- Vertical integration
- Horizontal integration
- Protection from a takeover
- Strengthening human resources
- Improving financial situation
Views of agroholding managers (2012)

What do do consider as your main risk factors?

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unpredictability of government policy in the agricultural sector</td>
<td>4.5</td>
</tr>
<tr>
<td>Risk of hostile takeover</td>
<td>3</td>
</tr>
<tr>
<td>Volatility of sale prices</td>
<td>4</td>
</tr>
<tr>
<td>Volatility of currency prices</td>
<td>3.5</td>
</tr>
<tr>
<td>Reduced availability of credit financing</td>
<td>4</td>
</tr>
<tr>
<td>Lack of storage facilities</td>
<td>3</td>
</tr>
<tr>
<td>Lack of facilities for products handling/transportation</td>
<td>3</td>
</tr>
<tr>
<td>Unavailability and high cost of yield loss risk insurance/mitigation</td>
<td>2</td>
</tr>
</tbody>
</table>
**Economic issues of production**

**Productivity and profitability issues**

- Wheat production figures (same applies to other crops)

<table>
<thead>
<tr>
<th></th>
<th>Agroholdings</th>
<th>Individual enterprises</th>
<th>Ratio agroholdings versus enterprises, 4 years average, %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Yield, dt/ha</strong></td>
<td>30</td>
<td>39</td>
<td>35</td>
</tr>
<tr>
<td><strong>Cost, UAH/t</strong></td>
<td>995</td>
<td>976</td>
<td>1321</td>
</tr>
<tr>
<td><strong>Sales price, UAH/t</strong></td>
<td>1136</td>
<td>1361</td>
<td>1596</td>
</tr>
<tr>
<td><strong>Profit, UAH/ha</strong></td>
<td>423</td>
<td>1502</td>
<td>962</td>
</tr>
<tr>
<td><strong>Profitability, %</strong></td>
<td>14</td>
<td>39</td>
<td>21</td>
</tr>
</tbody>
</table>

• Agroholding farms
  - higher yields at much higher costs
  - higher profits only in case of high prices

Source: AGRI Survey
Economic issues of production

Productivity and profitability issues

• Wheat production figures in 2012 (same applies to other crops)

➢ Huge discrepancies between farms!!!
➢ High yields often achieved by very high costs!!!

Source: AGRISURVEY (2013)
Analysis of Ukrainian enterprises for years 2008 – 2013

• Sample of ~600 enterprises, mainly crop and dairy farms
• After careful cleaning of outliers we got
  – unbalanced panel of >400 enterprises with data for a few years only
  – balanced panel of >200 enterprises with data for all years
• Approach: Data Envelopment Analysis
  – Outputs: sales value of (a) crops, (b) milk and (c) other animal products
  – Inputs: (a) labor units, (b) land in ha, (c) material costs and depreciation

➢ Group-level comparison of agroholding and independent farms
➢ Analysis of Technical Efficiency and Total Factor Productivity change
➢ Farm-level identification of efficiency and profitability determinants
Economic issues of production

Analysis of Ukrainian enterprises for years 2008 - 2013

<table>
<thead>
<tr>
<th>Balanced panel</th>
<th>Mean value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Independ. farms</td>
</tr>
<tr>
<td>Profit per ha (all years) (UAH/ha)</td>
<td>644</td>
</tr>
<tr>
<td>Profit per ha (only 2008) (UAH/ha)</td>
<td>381</td>
</tr>
<tr>
<td>Profit per ha (only 2009) (UAH/ha)</td>
<td>342</td>
</tr>
<tr>
<td>Profit per ha (only 2010) (UAH/ha)</td>
<td>594</td>
</tr>
<tr>
<td>Profit per ha (only 2011) (UAH/ha)</td>
<td>1045</td>
</tr>
<tr>
<td>Profit per ha (only 2012) (UAH/ha)</td>
<td>1060</td>
</tr>
<tr>
<td>Profit per ha (only 2013) (UAH/ha)</td>
<td>442</td>
</tr>
</tbody>
</table>

- On average, higher profits per hectare for independent farms
- Agroholding farms are catching up in good years
## Economic issues of production

### Analysis of Ukrainian enterprises for years 2008 - 2013

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<tbody>
<tr>
<td></td>
<td>Independ. farms</td>
</tr>
<tr>
<td>Land rental costs (all years) (UAH/ha)</td>
<td>378</td>
</tr>
<tr>
<td>Land rental costs (only 2008) (UAH/ha)</td>
<td>180</td>
</tr>
<tr>
<td>Land rental costs (only 2009) (UAH/ha)</td>
<td>246</td>
</tr>
<tr>
<td>Land rental costs (only 2010) (UAH/ha)</td>
<td>301</td>
</tr>
<tr>
<td>Land rental costs (only 2011) (UAH/ha)</td>
<td>363</td>
</tr>
<tr>
<td>Land rental costs (only 2012) (UAH/ha)</td>
<td>564</td>
</tr>
<tr>
<td>Land rental costs (only 2013) (UAH/ha)</td>
<td>661</td>
</tr>
</tbody>
</table>

- Agroholding farms pay significantly higher land rental costs!
- Land costs more than tripled between 2008 and 2013!
- Land costs per ha much higher than labor costs!
Productivity and efficiency issues

Analysis of Ukrainian enterprises for years 2008 - 2013

<table>
<thead>
<tr>
<th>Unbalanced panel</th>
<th>Mean value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Independ. farms</td>
</tr>
<tr>
<td>Technical efficiency (all years)</td>
<td>0.639 &gt;</td>
</tr>
<tr>
<td>Technical efficiency (only 2008)</td>
<td>0.628 &gt;</td>
</tr>
<tr>
<td>Technical efficiency (only 2009)</td>
<td>0.638 ~</td>
</tr>
<tr>
<td>Technical efficiency (only 2010)</td>
<td>0.668 ~</td>
</tr>
<tr>
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<td>0.680 &gt;</td>
</tr>
<tr>
<td>Technical efficiency (only 2012)</td>
<td>0.596 ~</td>
</tr>
<tr>
<td>Technical efficiency (only 2013)</td>
<td>0.623 &gt;</td>
</tr>
</tbody>
</table>

- No big difference in technical efficiency scores
  - advantage of independent farms (significance on 10%-level)
  - no significant change over time
### Productivity and efficiency issues

**Determinants of technical efficiency and profitability**

<table>
<thead>
<tr>
<th></th>
<th>Technical efficiency</th>
<th>Profitability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef.</td>
<td>P&gt;</td>
</tr>
<tr>
<td>Total production value</td>
<td>0.142</td>
<td>0.115</td>
</tr>
<tr>
<td>Animal production value</td>
<td>0.007</td>
<td>-0.020</td>
</tr>
<tr>
<td>Share animal production</td>
<td>0.670</td>
<td>0.572</td>
</tr>
<tr>
<td>Milk production value</td>
<td>-0.096</td>
<td>-0.148</td>
</tr>
<tr>
<td>Depreciation/ha</td>
<td>0.024</td>
<td>0.002</td>
</tr>
<tr>
<td>Services/ha</td>
<td>-0.027</td>
<td>-0.047</td>
</tr>
<tr>
<td>Material/ha</td>
<td>0.036</td>
<td>-0.031</td>
</tr>
<tr>
<td>Material/ha*Depreciation/ha</td>
<td>0.005</td>
<td>-0.043</td>
</tr>
<tr>
<td>Material/ha*Services/ha</td>
<td>0.105</td>
<td>0.053</td>
</tr>
<tr>
<td>Labor cost/unit</td>
<td>-0.003</td>
<td>-0.045</td>
</tr>
<tr>
<td>Land rent/ha</td>
<td>-0.015</td>
<td>-0.029</td>
</tr>
<tr>
<td>Member agroholding</td>
<td>-0.129</td>
<td>-0.244</td>
</tr>
</tbody>
</table>
Determinants of technical efficiency

• (Size +)
• Animal / milk production +- 
• Depreciation +
• Services –
  ➢ It is superior to operate with own equipment
• Higher intensity + (in combination with high technology)
• Rental price –
  – (Aggressive) growth does not pay off immediately
• (Member agroholding -)

() not significant
Productivity and efficiency issues

Determinants of profitability

• (Size +)
• Animal production –
• Depreciation +
• Services –
  ➢ It is superior to operate with own equipment
• (Higher intensity –)
• Rental price –
  ➢ (Aggressive) growth does not pay off immediately
• (Member agroholding –)

() not significant
Efficiency and profitability by agroholding (2008-2013)
Conclusions

• Ukrainian agriculture still far away from being efficient, but positive trends

• Absolute productivity is increasing
  – driven by higher intensities
  – partly/mainly driven by growth of agroholdings

• However: higher intensities
  – cause learning effects and adjustment costs
  – require appropriate technologies and know how
  – only pay off if farms achieve appropriate prices
    (international and national markets, infrastructure, institutions)
  ➢ farms need sound financial basis and access to finance
Conclusions

- Agroholding farms not per se more efficient and profitable
  - crop farming easier to manage than animal/dairy production
  - high input use has to be supported by investments in machinery
  - higher intensities cause learning effects

- Agroholdings should be aware that
  - efficiency must have first priority
  - returns of growth and investments only in the medium-term
  - growth requires sound financial basis
  - they need appropriate risk management strategies (price, market, policy risk)
  - aggressive growth has a high price (there may be better opportunities in the future)
  - interests of (rural) society need to be considered
  - efficiency suffers from transaction costs (e.g. theft)
  - management is expensive (headquaters, IPOs,...)
Conclusions

• Agricultural policy
  – should acknowledge contribution of agroholdings to economic development
  – should neither create barriers for agroholdings nor should favour them
  – should rather focus on improving institutional environment (fight corruption, provide stability,...)
  – should focus on development of infrastructure rather than subsidies (transportation, education,...)
  – should strengthen interests of rural stakeholders (economic and political participation)
Areas and topics for discussion include:

**Strategic Management:**
- Uncertainty, Risks and Volatility of Agricultural Markets
- Governance, Corporate Culture and Stakeholder Relations
- Investment/Divestment Decisions and Modes

**Boundaries of the Firm:**
- Large Farm Organization and Structure
- M&A vs. Organic Horizontal Farm Growth
- Agri-Food Chain Management

**Financial Performance:**
- Financial Diversification and Value Creation
- Planning, Monitoring and Controlling Systems
- Access to Finance

**Production Efficiency and Productivity:**
- Total Factor Productivity
- Technical Efficiency
- Optimal Farm Size

**Technologies & Innovations:**
- Tillage and Crop Technology Adoption
- Integrated Soil Fertility Management
- Farm Sustainability through Reduced Resource Use

**Human Capital:**
- HR Planning, Recruitment and Selection
- Motivation and Incentive Systems
- Learning, Training and Re-qualification

**On-Farm Security Systems**

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