Electronic vs. Open Outcry Trading in Agricultural Commodities Futures Markets

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Open Outcry
Electronic
Advantages of Electronic Trading

• Less Cost to the Exchange
• Transparency
• Speed of Execution
• Anonymity
• Lower Cost to Trade?
Purpose

- Determine liquidity cost of the KCBT hard red winter wheat futures contract in open outcry and electronic markets
What Is a Liquidity Cost?

• Difference between the price paid by an urgent buyer and the price received by an urgent seller
• Market and stop orders consume liquidity

• Limit orders provide liquidity
Liquidity costs
Previous Research

- Liquidity costs lower in electronic market
- Trade size higher in open outcry
- $\uparrow$ Volume $\implies\downarrow$ Liquidity cost
- Natural Monopoly
Why trade size larger with open outcry?

• Lower liquidity costs for larger trader

• Trade splitting in electronic markets
Kansas City Board of Trade (KCBT)

- Side-by-side trading on Globex began January 14, 2008
- Hard Red Winter Wheat
- Value – Line
- Electronic Option Trading
Goldman-Sachs Roll

- Index Fund
- Begins 5th Business Day
- Open-Outcry Only
- Perverse Incentives
Data

• Transaction Data

• www.kcbt.com

• 2008 – high volatility

• Minimum tick – 0.25 ¢/bu.
Liquidity Cost Measures

• Bid-ask spread

• Roll’s measure

• Average absolute price change
Roll’s Measure

\[ RM = 2\sqrt{-\text{cov}(\Delta F_t, \Delta F_{t-1})} \]
Average absolute price change

\[
\frac{\sum_{t=2}^{T} |\Delta F_t|}{T - 2}
\]
Weighted averages

No changes across days
Regression

Liquidity Cost =
\[ \beta_0 + \beta_1 \text{ Size} + \beta_2 \text{ Volume} + \beta_3 \text{ Time} \]
Figure 1. Monthly Volume of KCBT Wheat Futures Contract in 2008
Figure 2. Daily volume of Electronic and Open-outcry July 2008 Wheat Futures Contracts at KCBT Exchange
Table 1. Descriptive Statistics of Wheat Futures Contracts Traded at KCBT in 2008

<table>
<thead>
<tr>
<th>Contract</th>
<th>Open Outcry</th>
<th></th>
<th></th>
<th>Electronic</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>Average</td>
<td></td>
<td>Average</td>
<td>Average</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trades</td>
<td>Volume</td>
<td>per Day</td>
<td>Trades</td>
<td>Volume</td>
<td>per Trade</td>
</tr>
<tr>
<td>June</td>
<td>134</td>
<td>167.01</td>
<td>23.67</td>
<td>134</td>
<td>1194.60</td>
<td>3.67</td>
</tr>
<tr>
<td>Dec</td>
<td>241</td>
<td>72.04</td>
<td>33.97</td>
<td>241</td>
<td>991.13</td>
<td>3.62</td>
</tr>
</tbody>
</table>
Table 2. Measures of Liquidity Costs (cents/bushel) in Wheat Futures Contracts Traded at KCBT in 2008

<table>
<thead>
<tr>
<th>Contract</th>
<th>Open Outcry</th>
<th></th>
<th></th>
<th>Electronic</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Roll’s</td>
<td>Change</td>
<td>Roll’s</td>
<td>Change</td>
<td></td>
</tr>
<tr>
<td>June</td>
<td>1.18</td>
<td>1.23</td>
<td>0.63</td>
<td>0.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec</td>
<td>1.56</td>
<td>1.44</td>
<td>0.29</td>
<td>0.30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Previous Estimates for KCBT HRW

Thompson et al. (1993)  
1985 data  
0.28 – 0.29¢/bu. High volume contacts

Shah and Brorsen (2009)  
2007 data  
0.49¢ /bu.
Table 3. Results of the Regressions with Roll’s Measure of Open-Outcry Contracts as Dependent Variable

<table>
<thead>
<tr>
<th>Contract</th>
<th>N</th>
<th>Intercept</th>
<th>Days to Maturity</th>
<th>Volume per Trade</th>
<th>Total Volume</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>March</td>
<td>28</td>
<td>7.8067</td>
<td>-0.0889*</td>
<td>-0.0105</td>
<td>-0.0003</td>
<td>0.2773</td>
</tr>
<tr>
<td>May</td>
<td>42</td>
<td>1.8970</td>
<td>-0.0055</td>
<td>-0.0039</td>
<td>0.0004*</td>
<td>0.2265</td>
</tr>
<tr>
<td>June</td>
<td>94</td>
<td>2.5528</td>
<td>-0.0081*</td>
<td>-0.0167</td>
<td>-0.0001</td>
<td>0.1126</td>
</tr>
<tr>
<td>Sep</td>
<td>95</td>
<td>0.5311</td>
<td>0.0161*</td>
<td>0.0237</td>
<td>-0.0005</td>
<td>0.2071</td>
</tr>
<tr>
<td>Dec</td>
<td>140</td>
<td>1.9639</td>
<td>0.0065</td>
<td>0.0124</td>
<td>-0.0008*</td>
<td>0.1315</td>
</tr>
</tbody>
</table>
Table 4. Results of the Regressions with Roll’s Measure of Electronic Contracts as Dependent Variable

<table>
<thead>
<tr>
<th>Contract</th>
<th>N</th>
<th>Intercept</th>
<th>Days to Maturity</th>
<th>Volume per Trade</th>
<th>Total Volume</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>March</td>
<td>38</td>
<td>7.2840</td>
<td>-0.0603*</td>
<td>-0.0110*</td>
<td>-0.0007*</td>
<td>0.5314</td>
</tr>
<tr>
<td>May</td>
<td>61</td>
<td>3.7360</td>
<td>-0.0125</td>
<td>-0.0017</td>
<td>-0.0005</td>
<td>0.0517</td>
</tr>
<tr>
<td>June</td>
<td>125</td>
<td>0.2668</td>
<td>0.0017*</td>
<td>0.1243*</td>
<td>-0.0001*</td>
<td>0.3401</td>
</tr>
<tr>
<td>Sep</td>
<td>71</td>
<td>2.3866</td>
<td>-.0140*</td>
<td>-0.0248</td>
<td>-0.0002*</td>
<td>0.4230</td>
</tr>
<tr>
<td>Dec</td>
<td>189</td>
<td>1.2634</td>
<td>-0.00004</td>
<td>0.0799</td>
<td>-0.0002*</td>
<td>0.1439</td>
</tr>
</tbody>
</table>
Figure 3. Number of Trades at Different Time of the Day at KCBT in 2008
Figure 4. Liquidity Cost at Different Time of the Day at KCBT in 2008
Figure 5. Ending Values of Trade Price in Electronic and Open Out-cry Markets at KCBT in 2008
Conclusions

- Electronic trading $\Rightarrow \downarrow$ Liquidity cost
- Open outcry $\Rightarrow \uparrow$ Trading size
- More electronic trading