WILL RUSSIAN NATURAL GAS LONG-TERM CONTRACT PRICES REMAIN OIL PRICE DETERMINED AFTER THE END OF OIL-INDEXATION?

Péter Kaderják
Péter Kotek
Alfa Diallo

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Outline

• Question relevance and nature of LTC pricing
• Data description
• Hypothesis 1: European wholesale gas markets work in a competitive manner
• Hypothesis 2: European wholesale gas markets are oligopolistic, pricing is market-power dependent
  ▶ E-Index for market power quantification
  ▶ Multivariate panel regression analysis
• Conclusion
Why is this issue important?

- Majority of European gas consumption is traded on an OTC basis
- Oil-indexation as a main pricing mechanism
- Oversupply, over-contracting by the late-2000s - decoupling
- Re-negotiation and gradual phasing out of oil indexation from LTCs, replaced by gas-on-gas competition
- What drives LTC prices?

Source: IGU wholesale gas price survey 2017
Data description

- Eurostat, BAFA data 2010-2017
- 4-13 €/MWh price difference between countries
- LTC prices follow a trajectory of Brent crude
- LTC price convergence after 2014
- Different country profiles
  - Highest LTC prices: BG, EE, LT, SI
  - Lowest LTC prices: DE, CZ, GR
- Note: no information for DE, NL, DK, FR, UK in Eurostat

Countries analysed: Bulgaria, Czech Republic, Germany, Estonia, Greece, Hungary, Italy, Lithuania, Latvia, Romania, Slovenia, Slovakia

Source: author’s calculations based on Eurostat, EIA
LTC –TTF spread

• Main tendencies are similar to raw LTC prices

• Decrease in LTC-TTF spread since 2012
  ▶ Average spread in 2012: 9.72 EUR/MWh
  ▶ Average spread in 2017: 0.15 EUR/MWh

• Despite the fact the LTC prices increased from 2016 to 2017, LTC-TTF spread continued to decrease in the same time period

Source: author’s calculations based on Eurostat
Working hypotheses

• Competitive market:
  ▶ Goal of Russia is profit maximisation by keeping market share and sustaining market foreclosure
  ▶ LTC prices should reflect the price of the closest competitive alternative

• Market power issues
  ▶ Russia has the option to exert market power in the national markets
  ▶ Market power is estimated with the E-index
  ▶ LTC prices should reflect the market power of Russia
Competitive market

• Theoretical price:
  ▶ TTF+transportation cost for CZ, DE, HU, IT, SI, SK
  ▶ Klaipeda LNG for EE, LT, LV
  ▶ Greek price + transportation cost for BG
  ▶ HU price + transportation cost for RO

• Accidental for 2016, not valid for 2017

Source: author’s calculations based on ENTSOG and REKK data collection on tariffs
Estimating market power

- Exposure-index (E-index) to measure Russian market power

\[ E_{i,t} = \frac{C_{i,t} - P_{i,t} - I_{\text{max},i,t}}{C_{i,t}} \]

where \( i \) represent the different countries while \( t \) the different years. \( C \) stands for the annual consumption level, \( P \) is the annual production, while \( I_{\text{max}} \) is the maximum import capacity per year from non-Russian source.

- 0 (totally independent) and 1 (totally dependent)
- Index may be negative
## Evaluation of E-index

<table>
<thead>
<tr>
<th>Year</th>
<th>BG</th>
<th>CZ</th>
<th>DE</th>
<th>EE</th>
<th>GR</th>
<th>HU</th>
<th>IT</th>
<th>LT</th>
<th>LV</th>
<th>RO</th>
<th>SI</th>
<th>SK</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>0.97</td>
<td>-0.50</td>
<td>-0.17</td>
<td>1.00</td>
<td>-0.55</td>
<td>0.53</td>
<td>-0.34</td>
<td>0.75</td>
<td>1.00</td>
<td>0.05</td>
<td>-1.30</td>
<td>-0.83</td>
</tr>
<tr>
<td>2011</td>
<td>0.91</td>
<td>-0.70</td>
<td>-0.39</td>
<td>1.00</td>
<td>-0.25</td>
<td>0.50</td>
<td>-0.43</td>
<td>0.77</td>
<td>1.00</td>
<td>0.08</td>
<td>-2.88</td>
<td>-0.64</td>
</tr>
<tr>
<td>2012</td>
<td>0.98</td>
<td>-3.10</td>
<td>-0.15</td>
<td>1.00</td>
<td>-0.29</td>
<td>0.47</td>
<td>-0.52</td>
<td>0.43</td>
<td>1.00</td>
<td>0.06</td>
<td>-3.77</td>
<td>-1.34</td>
</tr>
<tr>
<td>2013</td>
<td>0.90</td>
<td>-4.84</td>
<td>-0.17</td>
<td>1.00</td>
<td>-0.72</td>
<td>0.45</td>
<td>-0.69</td>
<td>0.29</td>
<td>1.00</td>
<td>-0.02</td>
<td>-3.99</td>
<td>-2.82</td>
</tr>
<tr>
<td>2014</td>
<td>0.94</td>
<td>-5.80</td>
<td>-0.49</td>
<td>1.00</td>
<td>-1.37</td>
<td>0.40</td>
<td>-0.90</td>
<td>0.16</td>
<td>1.00</td>
<td>-0.12</td>
<td>-4.50</td>
<td>-7.29</td>
</tr>
<tr>
<td>2015</td>
<td>0.86</td>
<td>-5.88</td>
<td>-0.42</td>
<td>-3.18</td>
<td>-1.07</td>
<td>-0.02</td>
<td>-0.71</td>
<td>-1.53</td>
<td>-0.48</td>
<td>-0.15</td>
<td>-4.60</td>
<td>-5.84</td>
</tr>
<tr>
<td>2016</td>
<td>0.86</td>
<td>-5.67</td>
<td>-0.32</td>
<td>-2.96</td>
<td>-0.80</td>
<td>-0.01</td>
<td>-0.71</td>
<td>-1.74</td>
<td>-0.38</td>
<td>-0.14</td>
<td>-4.50</td>
<td>-6.87</td>
</tr>
<tr>
<td>2017</td>
<td>0.87</td>
<td>-4.13</td>
<td>-0.24</td>
<td>-3.02</td>
<td>-0.32</td>
<td>0.02</td>
<td>-0.71</td>
<td>-1.71</td>
<td>-0.58</td>
<td>-0.01</td>
<td>-3.96</td>
<td>-5.73</td>
</tr>
</tbody>
</table>

Source: author’s calculations based on ENTSOG and Eurostat

Independent even in 2010: CZ, DE, GR, IT, RO, SI, SK
Dependence reduced: HU, EE, LT, LV
Constant high dependence: BG

Positive correlation of LTC prices and E-index
Positive correlation of LTC TTF spread and E-index
(higher than raw case)
Multivariate panel regression

• We estimated two main fixed-effect panel regression
  ▶ Dependent variable: LTC price or LTC-TTF spread
  ▶ Variable of main interest: E-index
  ▶ Control variables: Brent oil price, linear time trend

\[ ltc_{i,t} = \alpha + \beta_1 * eindex_{i,t} + \beta_2 * brent_{i,t} + \nu_i + \rho t + u_{i,t} \]
\[ ltc_{i,t} - ttf_{t} = \alpha + \beta_1 * eindex_{i,t} + \beta_2 * brent_{i,t} + \nu_i + \rho t + u_{i,t} \]

• In both cases we included different sets of controls in the different regressions
• Standard errors were clustered on country level
Exposure has an effect on LTC prices

<table>
<thead>
<tr>
<th>VAR</th>
<th>(A) LTC</th>
<th>(B) LTC</th>
<th>(C) LTC</th>
<th>(D) LTC-TTF</th>
<th>(E) LTC-TTF</th>
<th>(F) LTC-TTF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eindex</td>
<td>1.949***</td>
<td>0.386*</td>
<td>-0.438</td>
<td>1.030***</td>
<td>0.574**</td>
<td>-0.161</td>
</tr>
<tr>
<td></td>
<td>(0.373)</td>
<td>(0.178)</td>
<td>(0.258)</td>
<td>(0.241)</td>
<td>(0.200)</td>
<td>(0.215)</td>
</tr>
<tr>
<td>Brent</td>
<td>-</td>
<td>0.327***</td>
<td>0.278***</td>
<td>0.0953***</td>
<td>0.0516***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.023)</td>
<td>(0.016)</td>
<td>(0.022)</td>
<td>(0.016)</td>
<td></td>
</tr>
<tr>
<td>Time trend</td>
<td>-</td>
<td>-</td>
<td>YES</td>
<td>-</td>
<td>-</td>
<td>YES</td>
</tr>
<tr>
<td>Obs.</td>
<td>96</td>
<td>96</td>
<td>96</td>
<td>96</td>
<td>96</td>
<td>96</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.141</td>
<td>0.652</td>
<td>0.722</td>
<td>0.136</td>
<td>0.285</td>
<td>0.477</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
Conclusions

• Is the market competitive or is there place for market power exertion?
• Hypothesis for competitive market is rejected
• E-index affects
  ▶ LTC price
  ▶ LTC-TTF spread
• Brent remained an important determinant of LTC prices
• Enhancing market competition affects LTC prices > countries should work on bringing alternative sources to compete incumbent
Thank you for your attention!

peter.kotek@uni-corvinus.hu
pkaderjak@uni-corvinus.hu
alfa.diallo@uni-corvinus.hu
Oil price escalation in LTCs – the Groningen formula

• Price linked to substitutes (typically HFO and LFO)

\[ P_t = P_0 + \alpha(HFO_{t-m} - HFO_0) + (1 - \alpha)(LFO_{t-m} - LFO_0) \]

- $P_t$: Price of LTC gas in month $t$
- $P_0$: Price of LTC gas in month 0
- $HFO/LFO$: Price of substitutes
- $\alpha$: Share of substitute
- $m$: Lag of substitutes (3-9 months)