A strategic perspective on competition in international natural gas markets

Robert A. Ritz*
Energy Policy Research Group (EPRG)
Judge Business School & Faculty of Economics
University of Cambridge, UK

Seminar at MIT Joint Program on the Science and Policy of Global Change
10 April 2015

*Thank you to the Enel Foundation for financial support. All views expressed and any errors are mine.
Competition in global gas markets

Global gas fundamentally changed over last 10 years

Traditionally, pipeline projects with long-term contracts
• High investment costs & degree of “asset specificity”

Today, increasingly trade in liquefied natural gas (LNG)
• Seller has choice over exporting to different regions
• Fukushima accident highlighted role of flexible LNG

⇒ Head-to-head competition of piped gas & LNG
(today especially in European market)
Global gas prices & LNG market power

10 years ago: Single global gas price due to LNG trade?

2010s: LNG exporters failing to arbitrage prices?
  - Qatar: “Forgone profit” up to US$100 million per day?
    • Estimates for short-term sales to UK vs Japan during 2011

⇒ Global prices explained by LNG market power

Source: IMF World Economic Outlook (October 2014)
Why (else) is global gas interesting?

① **US** looks set to become major **LNG exporter** due to shale gas “revolution”

② Re-emergence of **energy security** concerns due to Russia-Ukraine crisis

③ Potential role of natural gas in achieving medium-term **climate policy targets**

④ Longer-term evolution of natural gas market: Gas = “just another commodity” (like oil)?
Key points made in this talk

① Pipeline gas has a strategic advantage over multi-market LNG exporters
   • Gazprom’s traditional focus on Europe may be *good* news for “security of supply”

② Gazprom benefited from Fukushima in the short run, but lost over the longer term
   • European gas buyers lost out too

③ Strategic perspective on 2014 gas deals between Russia & China
   • “Power of Siberia” deal to develop new gas dedicated to China strategically better than “Altai”
Setup of the model

Multimarket competition between LNG & piped gas:
- Firm 1 sells into markets A and B (= Qatar to Asia & Europe)
- Firm 2 can sell only into market B (= Gazprom to Europe)

Game plays out in two stages:
1. Firms invest in production capacities
2. Firms decide how much to sell to each export market

Key assumptions for the results:
- Subgame-perfect Nash equilibrium
- Competition in strategic substitutes
- Both producers are capacity-constrained
- No price arbitrage by 3rd party traders
Strategic effect of multi-market exposure

Global capacity of firm 1 links markets via supply-side

Firm 2 “overinvests” in capacity in Stage 1 to gain market share in common market B

- In Stage 2, firm 1 has an alternative use for its capacity & equalizes “marginal revenue” across markets
  - Firm 2 does *not* (“asset specificity” of piped gas)

- Magnitude of this *strategic effect* depends on:
  1. Firm 1’s ability to capture surplus in market A
  2. Relative sizes of markets A and B
Competitive advantage of pipeline gas

**Proposition.** Firm 2 has a strategic advantage over multi-market firm 1 in common market $B$

- Firm 2’s = quasi-Stackelberg leader
- Overturns fundamental result from oligopoly theory: Higher-cost firm can have *higher* market share/profits

**Implications for security of supply***

1. Gazprom’s traditional focus on Europe may be *good* for gas buyers & security of supply
2. Herfindahl index as inverse security measure (e.g., European Commission) can yield “wrong” result

* The model ignores many relevant issues; it offers a test of “conventional wisdom” on supply security
Short-run impacts of Fukushima accident

Table 1: Asian LNG prices (JKM) and European gas prices (NBP) around the Fukushima accident (11 March 2011) in US$/MMbtu (Source: Platts)

<table>
<thead>
<tr>
<th></th>
<th>10 Mar</th>
<th>11 Mar</th>
<th>14 Mar</th>
<th>15 Mar</th>
<th>16 Mar</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>JKM</td>
<td>9.40</td>
<td>9.90</td>
<td>11.00</td>
<td>10.95</td>
<td>11.35</td>
<td>+20.7%</td>
</tr>
<tr>
<td>NBP</td>
<td>9.30</td>
<td>9.60</td>
<td>10.20</td>
<td>10.50</td>
<td>10.50</td>
<td>+12.9%</td>
</tr>
</tbody>
</table>

Over next year, LNG imports up by 25% & price up by 50%

What are the short-term spillover effects for Europe?

Capacity constraint of LNG exporters ⇒

① European gas buyers lose out
② Gazprom gains European market share
Longer-term impacts of Fukushima accident

Over longer term, firms can re-optimize their capacity levels

**Proposition.** Under plausible (technical) conditions, higher demand in market A raises the price & lowers firm 2’s market share in market B

**Intuition:**
- Fukushima allows LNG exporters to capture more surplus… … which reduces the adverse impact of strategic effect
- So LNG exporters respond by raising capacity investment… … which enables them to gain European market share

NB. Empirical evidence is limited & needs more work
Recent gas deals between Russia & China

May 2014: Russia & China $400bn “Power of Siberia” deal

- Largest-ever contract in history of gas
- Deliveries to start in 2018 for 30 years
- Price close to recent German gas imports
- China to extend $25bn of financing

November 2014: “Altai” deal for Western Siberian gas

FINANCIAL TIMES

Putin snubs Europe with Siberian gas deal that bolsters China ties

Russia as “swing producer” between Europe & Asia?
Analysis of Russia’s gas export strategy

① “Power of Siberia” deal does not expose Russia to multi-market strategic vulnerability of LNG – since this is new gas dedicated to China

② “Altai” deal is less attractive from strategic viewpoint as it involves existing gas that has gone to Europe – this can undermine Gazprom’s European position

③ More generally, diversification of a traditional pipeline exporter into LNG may come at a strategic cost
Other issues & model extensions

① Role of **uncertainty** over market conditions

② **Non-profit objectives** & state ownership

③ **Empirical work** on international gas markets

④ Any **other ideas**… ?
Thank you for listening!

Comments welcome: rar36@cam.ac.uk

This talk is based on:


It is also related to: