Strategic investment, multimarket interaction and competitive advantage: An application to the natural gas industry

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Overview of this talk

① Background on global gas markets

② Model of competition between pipeline gas & liquefied natural gas (LNG)

③ Analysis of competitive advantage & some implications for “security of supply”

④ How did the Fukushima accident affect European gas markets?

⑤ Observations on Russia’s gas export strategy
Competition in global gas markets

Global gas fundamentally changed over last 10 years

Traditionally, pipeline projects with long-term contracts

- High sunk investment costs & *asset specificity*
  Gas pipeline is physically bound from A to B, no alternative use

Today, significant trade in liquefied natural gas (LNG)

- Seller has *choice* over which country to export to
  2011 Fukushima accident highlighted role of flexible LNG

⇒ Head-to-head competition of piped gas & LNG  
   (especially in Europe)
Natural gas prices & LNG market power

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

2010s: LNG exporters failing to arbitrage prices?

⇒ Global prices explained by market power + limits to arbitrage in LNG shipping

Other price drivers:
• Differences in transport costs (√)
• LNG import capacity constraints ×

Source: IMF World Economic Outlook (October 2014)

NB. Large oil & gas price declines since late 2014
A stylized model of global gas markets

Multimarket competition
Firm 1 sells into markets A & B (Qatar LNG → Asia & Europe)
Firm 2 sells only into market B (Russian gas → Europe)

Two-stage game
① Investments in production capacities
② Decisions on export volumes
  • Pipeline gas & LNG have different cost structures
    □ Capex vs opex; Δtransport costs

Other assumptions
• Subgame-perfect Nash equilibrium
  □ Linear demand in market B (strategic substitutes)
  □ Both producers are capacity-constrained
• No price arbitrage by 3rd parties
Strategic advantage of piped gas over LNG

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

Global LNG capacity ⇒ **supply-side link** between markets

Firm 2 “**overinvests**” in capacity in Stage 1 to gain market share (and profits) in common market $B$

Why? To exploit a **strategic effect** in Stage 2:
- Firm 1 has an alternative use for its capacity so equalizes marginal revenue across markets
- Firm 2 does *not* (“asset specificity” of piped gas)

⇒ Pipeline gas as quasi-Stackelberg leader over LNG
Complementarity between low costs & “focus”

Let single-market firm 2’s **relative market share** (or relative profits) in market B be a measure of **competitive advantage**

**Proposition.** Lower costs and “focus” are complements in creating competitive advantage for firm 2.

- Asset specificity helps firm *exploit* a given cost advantage
  - *Intuition*: Strategic effect intensifies competition, so cost advantage more valuable

⇒ **Gazprom has two self-enforcing advantages** over LNG:
  ① **Lower costs** of supplying gas to Europe
  ② **Strategic commitment** to European market
Implications for “security of supply”

1. Gazprom’s traditional focus on Europe is good for gas buyers & “security of supply”
   - Daniel Yergin: “Availability of sufficient supplies at affordable prices” ≈ (expected) CS

2. Herfindahl index as inverse measure of security (European Commission) can yield “wrong” result*

Simplest example of Stackelberg effect

Cournot: Q={1/3,1/3}, P=1/3, CS=44%, H=1/2
Stackelberg: Q={1/2,1/4}, P=1/4, CS=56%, H=5/9

⇒ Stackelberg raises Herfindahl and consumer welfare

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

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 increase capacity investment… … which makes Gazprom *lose* European market share

⇒ Gazprom benefited from Fukushima in SR but lost in LR
Recent gas deals between Russia & China

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

Largest-ever contract in history of natural gas
- Deliveries to start in 2018 for 30 years (?)
  - Price close to German import price (?)
  - 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 = “swing producer” between Europe & Asia?
“Power of Siberia” deal does not expose Russia to multi-market strategic vulnerability of LNG – since this is new gas dedicated to China

“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

Also differences in costs & politics

More generally, diversification of a traditional pipeline exporter into LNG may come at a strategic cost
References

Comments & feedback welcome: rar36@cam.ac.uk

This talk is based on recent & ongoing research:


Why does global gas matter?

① Re-emergence of **energy security** concerns due to Russia-Ukraine crisis

② Potential role of natural gas in achieving medium-term **climate policy targets**

③ **US** looks set to become major **LNG exporter** due to shale gas “revolution”

④ Large **investment** volumes & **merger** activity especially in LNG value chain

⑤ **Long-term evolution** of natural gas market: Gas = “just another commodity” (like oil)?
Factors that do not (fully) explain gas prices

“Price differentials are driven by transport costs”

• If two export destinations have **different transport costs**, this should be reflected in prices—*even in a competitive market*

“Prices differ due to import capacity constraints”

• If LNG **import demand > import capacity**, then this can drive price above marginal cost—*even in a competitive market*

• **Problem**: Price differences often **much** larger than justified by transport costs
  – Qatar shipping costs very similar for Europe & Asia

• **Problem**: Global capacity utilization of LNG import terminals is only ~40%
  – *Post-Fukushima Japan*: 49%
  • Source: IGU, 2013

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Role of antitrust policy in gas/LNG markets

Natural gas markets historically are highly regulated
  • Even after (partial) liberalization since the 1980s, significant regulation & competition-policy scrutiny

EC investigation of Gazprom’s CEE pricing strategies
  • Prima facie evidence for absence of a single competitive EU market? (Pierre Noël)

Antitrust policy to date largely absent from LNG
  • Shell-BG merger cleared by EU, China, AUS – impacts on future LNG market structure?