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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

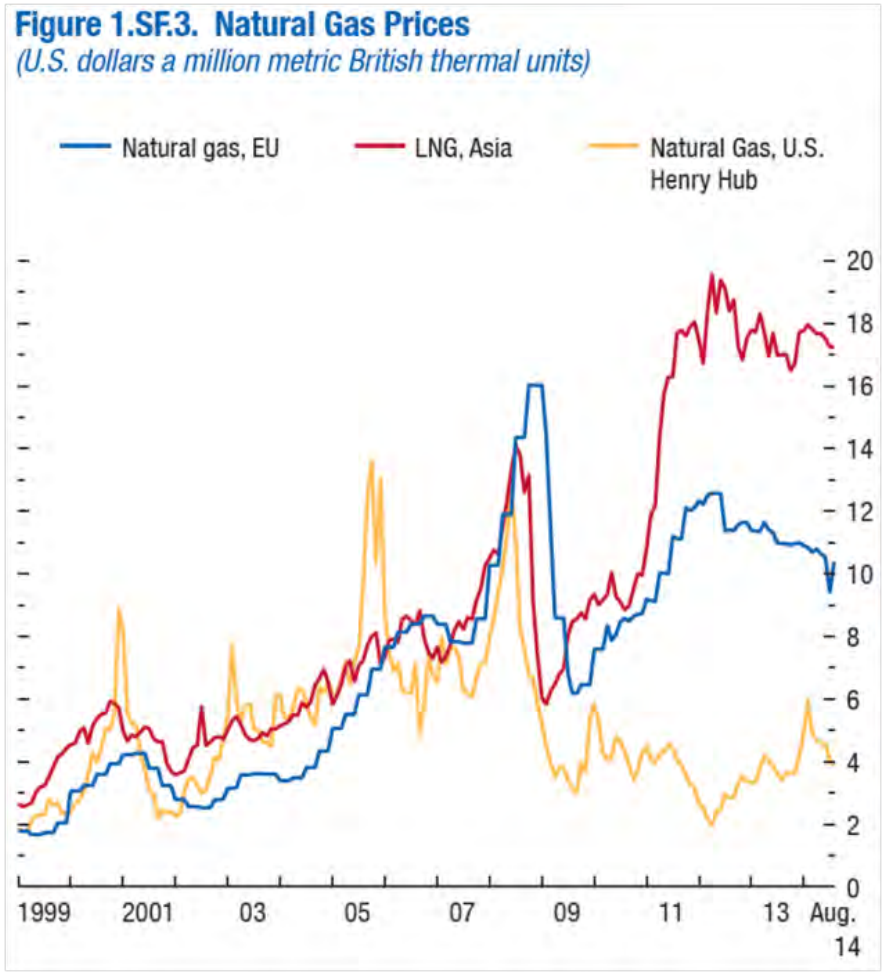
- High sunk investment costs & *asset specificity*
  Gas pipeline is physically bound from A to B, no alternative use

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



Source: IMF World Economic Outlook (October 2014)

NB. Large oil & gas price declines since late 2014

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 ✗

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

Table 2: Asian LNG prices (JKM) and European gas prices (NBP) around the Fukushima accident (11 March 2011) in US$/MMbtu

	10 Mar	11 Mar	14 Mar	15 Mar	16 Mar	% change
Asia	9.40	9.90	11.00	10.95	11.35	+20.7%
Europe	9.30	9.60	10.20	10.50	10.50	+12.9%

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?

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

- ❑ Also differences in costs & politics

③ More generally, **diversification of a traditional pipeline exporter into LNG may come at a strategic cost**

References

Comments & feedback welcome:
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This talk is based on recent & ongoing research:

- **Ritz, Robert A. (2015)**, "Strategic investment, multimarket interaction and competitive advantage: An application to the natural gas industry", Working Paper at Cambridge University, December 2015.

- **Ritz, Robert A. (2014)**, "Price discrimination and limits to arbitrage: An analysis of global LNG markets", *Energy Economics* 45, September 2014, pp. 324–332

- **Ritz, Robert A. & Matthew Zaragoza-Watkins** (***in progress***), "The welfare impacts of price discrimination: Evidence from global LNG markets". Project funded by MIT CEEPR.

Backup slides

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

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

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?