

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

**Robert A. Ritz**

Energy Policy Research Group (EPRG)  
Judge Business School & Faculty of Economics  
University of Cambridge, UK  
[rar36@cam.ac.uk](mailto:rar36@cam.ac.uk)

**Paris Seminar in Energy Economics**

13 April 2016

\*Thank you to the Enel Foundation for financial support.  
All views expressed and any errors are mine.

# 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

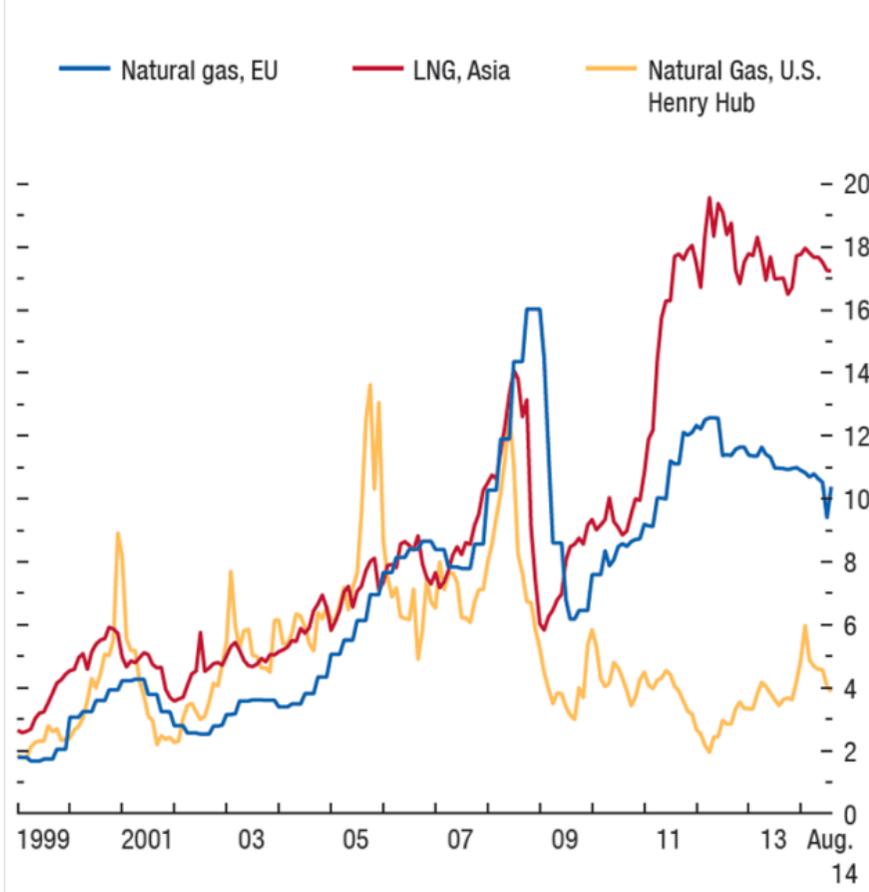
**Today, significant trade in liquefied natural gas (LNG)**

- 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

**Figure 1.SF.3. Natural Gas Prices**  
(U.S. dollars a million metric British thermal units)



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;  $\Delta$ transport costs

## Other assumptions

- Subgame-perfect Nash equilibrium
  - Linear demand in market *B* (*strategic substitutes*)
  - Both producers are capacity-constrained
- No price arbitrage by 3<sup>rd</sup> 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  $\Rightarrow$  **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)

$\Rightarrow$  **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*”  $\approx$  (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%,  $H=5/9$

$\Rightarrow$  **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:**

[rar36@cam.ac.uk](mailto:rar36@cam.ac.uk)

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?