Market power in global LNG

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Overview of this talk

Global gas prices & LNG trade flows explained by:

1. LNG producers have significant market power
2. Limits to price arbitrage in global LNG

Two cases of particular interest & importance:

1. Qatar short-term LNG sales to Japan & UK
2. Potential impact of US LNG exports

Evolution of LNG market since 2000

Large growth in LNG volumes & values

- Increased investment in LNG infrastructure
- Larger LNG shipping fleet & lower transport costs

LNG connects previously separate geographies

- More flexible contracting between buyers & sellers
- Short-term LNG up 10-fold since 2000 (now 25% of total)

$\Longrightarrow$ **Widespread conjecture of global gas price convergence**

Price non-convergence: Irrationality?

Large regional price divergence since Fukushima (March 2011)

- 2012 average prices $\approx$ Japan \$16, UK \$9, US \$3/MMBtu

Some commentators argue LNG players acting "irrationally"

- Major exporters sell short-term LNG to both Asia & Europe
- Forgone profit = |Price differential| $\times$ Quantity sold to Europe?
  - Forgone profit for Qatar up to \$100m *per day* (Japan vs UK)

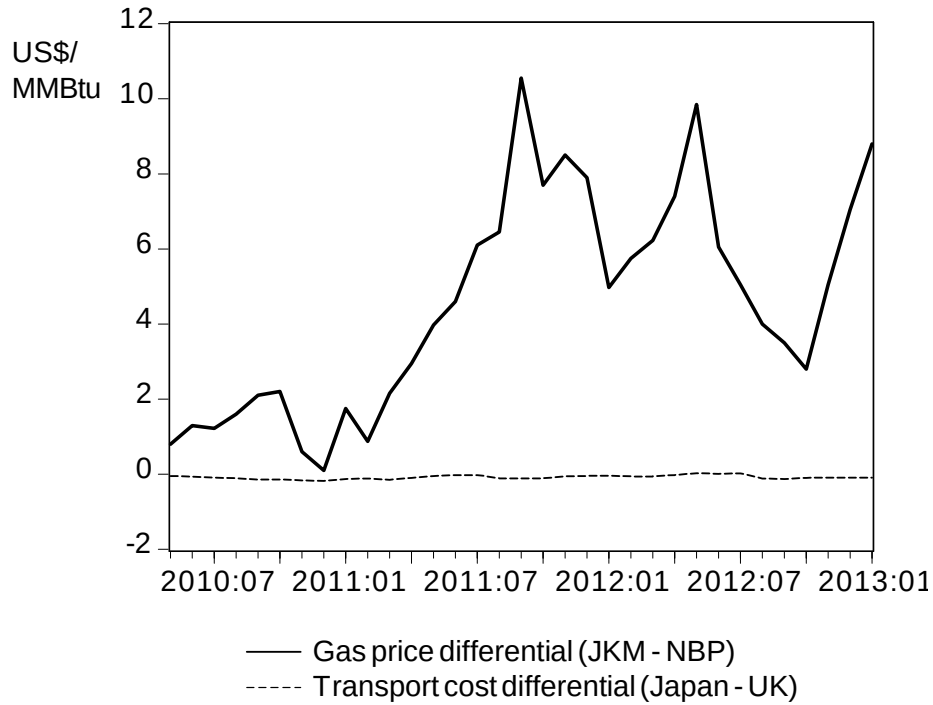
$\Longrightarrow$ **LNG exporters failing to engage in price arbitrage**?

An explanation based on transport costs?

Competitive model predicts netbacks equalized across markets

- So regional price differential = difference in transport costs

Figure: Qatar LNG sales to Japan & UK



$\Longrightarrow$ **Competitive model cannot explain observed gas prices**

Understanding a profit-maximizing LNG exporter

Producer k sells uncommitted LNG into $N \geq 2$ export markets

Fundamental conditions for profit-maximization:

$$MR_i^k = MC^k + t_i^k + \lambda^k \text{ for market } i$$

$$\Longrightarrow MR_i^k - t_i^k = MR_j^k - t_j^k \text{ for any two markets } i \text{ and } j$$

$\Longrightarrow$ **Producer equalizes marginal revenues** (net of transport costs)

- Equal marginal revenues does *not* imply equal prices
  - Prices *optimally* far apart if demand conditions very different
  - Argument applies very generally (e.g., mode of competition)

$\Longrightarrow$ **Key point**: **Market power easily rationalizes observed prices**

Case study: Price-cost margins for Qatar

Inputs (prices & costs)

IEA estimates: Indicative unit cost for production, liquefaction & regasification = \$3.00/MMBtu (in 2008 US\$)

$\Longrightarrow MC^k = 3.90$ (for 2012) & not capacity-constrained ($\lambda^k = 0$)

- **Japan**: Price $p_i^k = 16$ & transport cost $t_i^k = 2.10$
- **UK**: Price $p_j^k = 9$ & transport cost $t_j^k = 2.15$

Results ("market power")

Define price-cost margin $L_i^k \equiv \left[(p_i^k - t_i^k) - MC^k\right] / p_i^k$

- **Qatar-to-Japan**: $L_i^k \simeq 63\%$
- **Qatar-to-UK**: $L_j^k \simeq 33\%$

$\Longrightarrow$ **Significant mark-ups to both markets, twice as high for Japan**

Limits to arbitrage: LNG buyers

- **Contractual constraints**
  - Some destination restrictions persist despite greater flexibility
  - LNG exporters may restrict resale onto commodity exchanges
- **Shipping capacity**
  - Larger LNG fleet—but only small proportion is uncommitted
  - Shipping market unable or unwilling to provide transport
- **Vertical issues**
  - Redirecting cargo forgoes LNG buyer's downstream surplus
  - Complex ownership arrangements along LNG supply chain

Limits to arbitrage: Third-party traders

JP Morgan Cazenove 2012 LNG industry report

> *"The entry barriers to LNG trading are surprisingly high—new entrants require more than just experienced traders and trading systems. They must have access to cargoes, but the market's liquidity is typically held captive by the LNG liquefaction owners/upstream suppliers who are understandably very reluctant to release volumes for traders to trade with. Traders must also have access to shipping, either via owned vessels or the charter market. Furthermore, certain ships can unload at certain terminals (e.g., many import terminals cannot accommodate Q-Max vessels). This can make it even more difficult to efficiently connect volumes to buyers."*

- **Other arbitrage considerations**: Time, risk, units, market power

Looking ahead: More arbitrage & US exports?

What if LNG price arbitrage intensifies?

1. Consumers likely better off—in aggregate
   - European gas buyers probably lose out
2. LNG producers' profit need not decline
   - Current pricing *might* be a prisoners' dilemma

What if US becomes a large LNG exporter?

- US market largely isolated from rest of world
  (rise of shale gas; lack of export infrastructure)
- US & non-US prices (or netbacks) need not converge

Recent EPRG research on global gas

Thank you for listening

This talk is largely based on a recent research paper:

Robert A. Ritz (2013). "Price discrimination and limits to arbitrage in global LNG markets." EPRG Working Paper 1317, September 2013 (updated November 2013)

Available at: http://www.econ.cam.ac.uk/faculty/ritz

Comments & feedback welcome
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