

Long-term Contracts and Efficiency in the LNG Industry

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Do long-term contracts enhance or hinder efficiency in capital-intensive markets?

Setting: Global LNG industry (2004-2017)

- ▶ Large sunk investments (\$10+bn terminal)
- ▶ Long-term contracts dominate (70% of trade, 20+year duration)
- ▶ Active spot market coexists and is growing
- ▶ Demand uncertainty and regional price dispersion
- ▶ Buyers have bargaining power → holdup concerns

Model Strengths and Highlights

Key Features: Contracts affect both **investment incentives** & **residual spot supply**

1. Classic hold-up problem
 - Without contracts: sellers anticipate weak bargaining power ex-post → Underinvestment
2. Spatial demand variation \Rightarrow Reallocative gains from spot trade
3. Allocative inefficiency from contracts
 - Contracts commit quantities to specific buyers/regions
 - When demand shocks occur: gas cannot be reallocated efficiently and spot market becomes thinner

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Contracting Externalities: Parties do not internalize that a contract reduces

- ▶ Residual supply available to others
- ▶ Raises spot prices for remaining buyers

⇒ Excessive contracting in equilibrium

Why This Matters for Competition Policy

- ▶ Long-term contracts often include
 - Destination clauses (no resale)
 - Take-or-pay provisions
- ▶ These clauses have attracted antitrust scrutiny
 - EU (2003) ruled destination clauses anticompetitive
 - Japan (2017) banned destination clauses in new LNG contracts

Central tension for regulator: Long-term contracts may

- ▶ Encourage investment: solve hold-up problem
- ▶ Distort allocation by reducing flexibility

This paper provides a quantitative framework to evaluate this trade-off

Identification of the Bargaining Parameter

What's nice: Identifying τ from contract timing & size variation

- ▶ Standard approach: use prices (unavailable in LNG)
- ▶ This paper's approach: exploit outside option variation across geography & time
- ▶ Key idea:
 - Geographically isolated sellers (far from alternative buyers): weaker outside options \Rightarrow capture less from ex-post bargaining \Rightarrow more likely to under invest
 - To compensate, parties sign larger ex-ante contracts

Identification of the Bargaining Parameter

Suggestions:

- 1. Connect reduced form to structural τ**
 - Using the estimated model, generate the model-implied relationship between ex-ante contract share and isolation measures
 - Plot: Ex-ante contract share vs. seller's relative distance to alternative buyers from data
 - Confirm that the model-implied contract-isolation relationship matches the data
- 2. Show how model fit deteriorates as τ varies**
- 3. Emphasize contribution and generalizability:**
 - Works whenever contracts + investments observed but prices missing

Counterfactuals: What is the efficient level contracting?

- ▶ Paper shows equilibrium contracting reduces welfare relative to no-contract world (+\$22bn)
- ▶ But no-contracting is not necessarily optimal (investment falls 31%)

Proposed counterfactual:

1. Solve planner choosing $\{q_{ij}^c, K_i\}$ to maximize total welfare
 2. Characterize optimal share of contracting
- ▶ Would help separate:
 - Efficiency losses from over-contracting
 - Efficiency gains from commitment

Spot Market Deepening

- ▶ Spot and short-term LNG trade expands markedly during 2004–2017
- ▶ In the model:
 - Thicker spot markets → higher value of reallocative flexibility
 - Stronger outside options → weaker hold-up → lower need for ex-ante contracts

Question: Do long-term contracts become more distortionary over time?

- ▶ Empirical check: Does contract share decline as spot trade grows?
- ▶ Clarify how this trend affects interpretation of results

Policy Implications

- ▶ Banning resale restrictions has a big effect
 - Investment falls by 30%, but welfare rises by 21%
 - Much larger welfare gain than eliminating contracts altogether
- ▶ Policy should target contract rigidities
- ▶ Other possible levers?
 - Contract duration caps
 - Limits on exclusive capacity lock-up

Dynamic Entry/Exit

- ▶ Currently: market structure exogenous
- ▶ But: US LNG exports grew from near-zero (2010) to major exporter (2020)
- ▶ How do long-term contracts affect entry incentives?
- ▶ Does flexibility reform change market structure over time?

Climate Policy

- ▶ Transition to renewables → increased demand volatility
- ▶ This framework: increase in the value of flexibility and distortions by contracts

Thank you!