Price discrimination and limits to arbitrage: An analysis of global LNG markets

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Introduction

- Puzzle:
  1. Gas prices around the world vary substantially despite being connected by international trade of liquefied natural gas (LNG).
  2. The observed price differences cannot be explained by differences in LNG exporters' transportation costs.
- Are LNG exporters acting irrationally by not arbitraging prices (as argued by some industry observers)?
- Or is there some rational explanation for their behavior?

Contribution

- The paper provides a simple, yet powerful, model of price discrimination that can explain price differences in gas markets.
- The model highlights the heterogeneity in price elasiticity of demand across export markets as **another source of price divergence** (besides transportation costs).
- Intuition:
  - LNG exporters with market power will **equalize marginal revenues net of transportation costs (instead of prices net of tranportation costs)** across markets.
  - This "strategic arbitrage rule" is different from the arbitrage rule under perfect competition and can result in large and persistent price differences that are greater than differences in transportation costs.

Contribution (cont')

- The paper provides a nice formula for relative prices between any two export markets, in terms of a seller's transportation costs and price elasticities of demand.
  - This formula is rather general: it does not depend on specific functional forms or particular competitive conducts in the export markets.
  - Moreover, it does not feature production costs, which is a great informational advantage given the shortage of available data on LNG markets.
  - Finally, it shows that any observed pair of prices and transportation costs can be rationalized by a pair of price elasticies of demand.

Contribution (cont')

- One advantage of the proposed model is that it can be used to estimate producer-specific demand elasticities.
- An identification issue arises because the pair of elasticities that rationalizes the data is not unique (in general).
- However, it is possible to pin down unique values of these elasticities if:
  1. production cost information is available.
  2. or a specific competitive conduct (e.g. Cournot competition) is assumed.

Comments

Determinants of market power

- The paper relates the differences in gas prices (net of transportation costs) to differences in price-elasticities of demand across export markets.
- As a further step, it would be interesting to gain some insights into the **determinants of these price elasticities,** and in particular those of a regulatory nature.
  - For instance, Newberry (2008) shows that the particular way climate change policy works in the EU (through pricing a fixed supply of EU Emission Allowances) is likely to amplify the market power of gas producers.
- One could then try to see how these determinants are likely to vary across markets in the future and, ultimately, get a sense of whether market-power-driven price differences will tend to increase or decrease.

Comments

On the potential uses of the model

- The calibration exercise undertaken in the paper is useful: it provides rough estimates of the price-elasticities of demand with minimal data requirements.
- These elasticities can also be estimated through other techniques using data on quantities and prices.
- If combined with independent estimates of demand elasticities, the model could be used for other purposes. For instance:
  - If production cost information is available, it could be used to test whether LNG exporters are capacity constrained.
  - If there is an independent evidence that a given LNG exporter is not capacity constrained then it could be used to estimate its marginal cost.

Comments

Market power and price volatility

- It is informally suggested that market power could increase the volatility of prices.
- Is it possible to incorporate uncertainty in the model and establish formally a (possibly positive) relationship between market power and price volatility?
- If an increase in market power exacerbates price volatility then policies that would mitigate the market power of LNG exporters would not only reduce the (average) level of prices but also their volatility.

Comments

Strategic buyers

- Could the model be extended to account for strategic players on the demand side?
- This would be interesting for two reasons:
  - Some LNG buyers do have some buyer power.
  - This would be a first step towards a model that would account for the possibility that some LNG players are active both as sellers and buyers (as is the case in the real world).