Liberalizing the Gas Industry: Take-or-Pay Contracts, Retail Competition and Wholesale Trade

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Motivation

• The liberalization of the natural gas industry is a hot topic in the European policy agenda
• Until recently, focus on the security of supply and the problem of access to transport infrastructures (upstream segments)
• Competition downstream and the development of wholesale markets are emerging themes
• We argue that, contrary to the electricity market, there is not, so far, a common view on how competition works in the gas market
• We analyze entry and competition in the downstream segments (retail) once (assuming) the access problems is solved.
• Policy issue: Are we sure that ensuring Third Party Access (TPA) to infrastructure is sufficient to obtain competition in the downstream market?
Long term contracts and TOP

• The upstream segment is still dominated by long term contracts with:
  – Take-or-pay quantity obligations + upward flexibility
  – Price indexed to oil

• Italy:
  • 2005-2008: total demand slightly above production + TOP obligations, and below production + TOP + upward flexibility
  • 2009-2011: total demand below production + TOP obligations

• Even before the crisis, TOP obligations cover most of the demand

• How TOP contracts affect downstream competition?
Three key features of the gas industry after liberalization plans:

- **Wholesale activity**: long-term import contracts with take-or-pay obligations:
  - Zero marginal costs on a relevant portion of capacity
- **Retail activity**: retailers have to select the submarkets to serve, with some limited scope for differentiation in services:
  - Retail market can be opened to competition and ensure small but positive margins.
- **Market organization**: no separation of wholesale and retail activities, absence of a wholesale market, bilateral contracts:
  - Retailers with TOP obligations have to design marketing strategies and select which clients to approach
Results

• If the incumbent's TOP portfolio does not cover the entire demand, entry occurs

• But the firms avoid face-to-face competition and select different submarkets, setting high (monopoly) prices in each of them (market segmentation);

• Imposing antitrust ceilings modifies the allocation of market shares but maintains segmentation and high prices in most of the market;

• Introducing a compulsory wholesale market determines generalized entry and retail competition and does not require unbundling of retail and wholesale activities

• Introducing restrictions (linear prices) on wholesale contracts is effective only with ownership unbundling of retail and wholesale activities
The model: demand

- Total demand $D$ is **inelastic** and can be divided into different **submarkets** (by location and/or type of end user – domestic, industrial, power, etc.)

- In each submarket the active retailers offering gas are perceived as **differentiated** (by location, commercial services etc.):
  
  - Competition in the retail segment allows obtaining small but positive margins, i.e. **competition is viable and liberalization is justified**
The model: supply

- **Wholesale activity**: buy gas from the producers/importers under TOP obligations
- **Retail activity**: select the submarkets and sell gas to final users
- Retail and wholesale activities are **bundled** within each company. Hence, operators buy gas under TOP obligations and select submarkets where they resell gas to final users
- Two operators, incumbent $I$ (large, with an established customer base) and competitor $C$
- TOP obligations: 
  \[
  \bar{q}^I \leq D \\
  \bar{q}^C = D - \bar{q}^I
  \]
The cost function

- Marginal cost
- TOP obligations
- Costs
- Gas unit price

\[ w \]

\( q^i \)
The model: timing

Period $t_1$:
- $I$ decides whether to enter market 1 (equal to I’s TOP obligations)
- $C$ observes $I$’s choice and decides whether to enter market 1
- the active firm(s) post (simultaneously) a price;

Period $t_2$:
- $I$ decides whether to enter market 2 (equal to C’s TOP obligations),
- $C$ observes I’s choice and decides whether to enter market 2
- the active firm(s) post (simultaneously) a price;

Strategic link between the two markets: residual TOP obligations
TOP obligations, price competition and entry

• **Symmetric price competition:**
  – When both firms compete still having TOP obligations (high marginal cost $\theta$) or having exhausted them (low marginal cost $w$), both obtain positive sales and margins over the relevant marginal cost, due to product differentiation;

• **Asymmetric price competition:**
  – When a firm with no residual TOP obligations (high marginal cost $w$) competes with a firm still burdened by TOP obligations (low marginal cost $\theta$), the former gets no sales and profits;

• **Entry in the second market:**
  – A firm enters in market 2 if it has residual obligations, otherwise it stays out.
First market equilibrium and entry

- **If both I and C enter:**
  - both obtain low *competitive* margins in **market 1** and retain positive residual capacity
  - therefore they both enter in **market 2**, again with low *competitive* margins;

- **Alternatively, if I enters but C does not enter:**
  - firm *I* sets a high *(monopoly)* price in **market 1**,
  - exhausts its TOP obligations in the first market
  - and does not enter **market 2**, where *C* enters as a *monopolist*. 
• **Proposition:** When $\bar{q}^I = D$, in the unique subgame perfect equilibrium the incumbent enters the market and charges the monopoly price while the competitor stays out.

• **Proposition:** When $\bar{q}^I < D$, in the unique subgame perfect equilibrium the incumbent enters the first market, the competitor enters the second market and both firms set the monopoly price.

• **Proposition:** If the competitor chooses its TOP obligations before the entry game is played, $C$ chooses obligations equal to the residual demand, i.e.

$$\bar{q}^C = D - \bar{q}^I$$

• Hence, we obtain entry without competition and a marginal role for the entrant
Policies: (1) antitrust ceilings

- UK, Spain and Italy have introduced **gas release programs** or **antitrust ceilings** to limit the market share of the incumbent and encourage entry.

- If the incumbent can transfer **part of its TOP obligations**, the previous arguments apply, with different market shares.
  - Redistribution of rents – no positive effects for consumers.

- If the incumbent retains its TOP obligations but has to sell some gas ($q'$) at its marginal cost $w$, this portion of the market will be served at the competitive price
  - Some positive effects on consumers (on $q'$ units)
Policies (2):

compulsory wholesale market

- **Compulsory wholesale market:**
  - all gas bought wholesale upstream must be sold in an anonymous market
  - retailers must buy their gas (to be resold downstream) from this market
  - A dispatcher collects the wholesale bids, forms a merit order and commands the wholesalers how much to supply at a common wholesale price

- Retailers still choose which submarkets to serve and offer a differentiated service, but now they have a flat marginal cost equal to the wholesale price > generalized entry and competition
Policies (2):
compulsory wholesale market

• Wholesale price covers costs and TOP obligations: $p_w = w$

• Competitive retail prices $p = p_w + \frac{\psi}{2}$

• No need to unbundle wholesale and retail activities: the dispatcher creates a separation between wholesale and retail decisions, avoiding strategic manipulation

• Even without controlling the final market, the wholesalers meet their TOP obligations

• If competition in the wholesale market is relaxed, $p_w > w$ and the retail price increases accordingly.
Policies (3):
restrictions on wholesale contracts

- Possible **restrictions on the contracts** between the wholesale unit and the retail unit of the firms
  - Linear contracts
  - No price discrimination
  - Obligation to serve all demand at posted prices

- Ownership unbundling: generalized entry and competition
  \[ p_w = w \quad \text{and} \quad p = p_w + \frac{\psi}{2} \]

- Vertical integration: \( p_w > w \), nobody buys from rival firms
  - Segmentation persists
Conclusions

• Solving the access problem to infrastructures is not enough
  – If retailers have TOP obligations, segmentation and monopoly prices emerge
  – Gas release programs have at most a marginal effect on consumers

• A compulsory wholesale market induces generalized entry and competitive margins in the retail market
  – Creating a market is not easy, although gas hubs are developing across Europe, firstly motivated by balancing services and then feeding spot trade and gas-to-gas competition

• Restrictions on wholesale contracts are effective only with unbundling
  – Forcing unbundling is not easy