Vertical Structure in the Natural Gas Market

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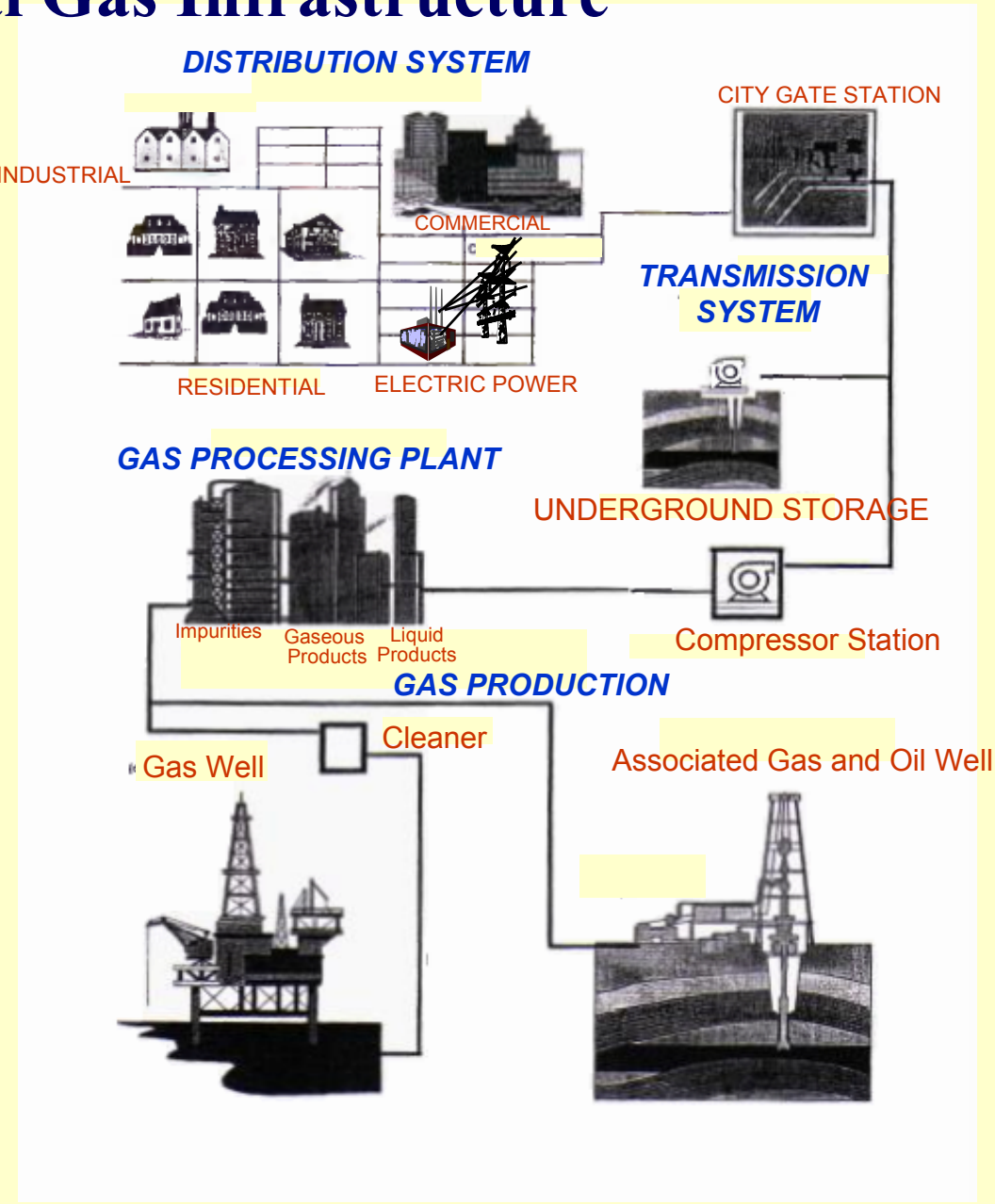
Outline

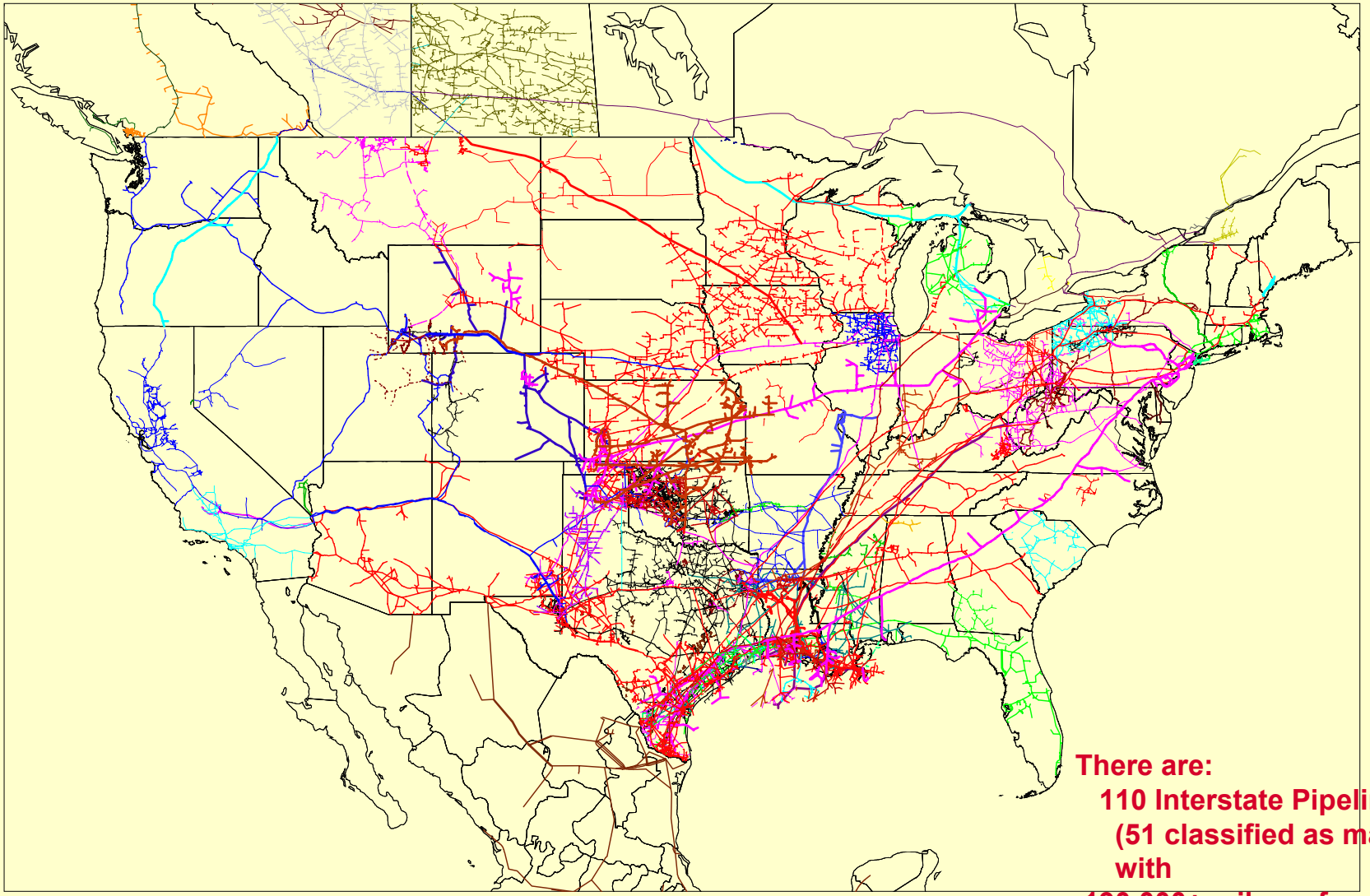
- Background on the North American Natural Gas Market
  - Overview and history of regulated and unregulated aspects
- Theoretical treatment of vertical foreclosure
- Case of El Paso Natural Gas
- Future research questions

Overview of North American Natural Gas Industry
Natural Gas Infrastructure

- Path of Natural Gas
  - From Reservoir to Burner-tip
    - Production
    - Processing
    - Transmission
    - Distribution
  - From the Well to the Consumer

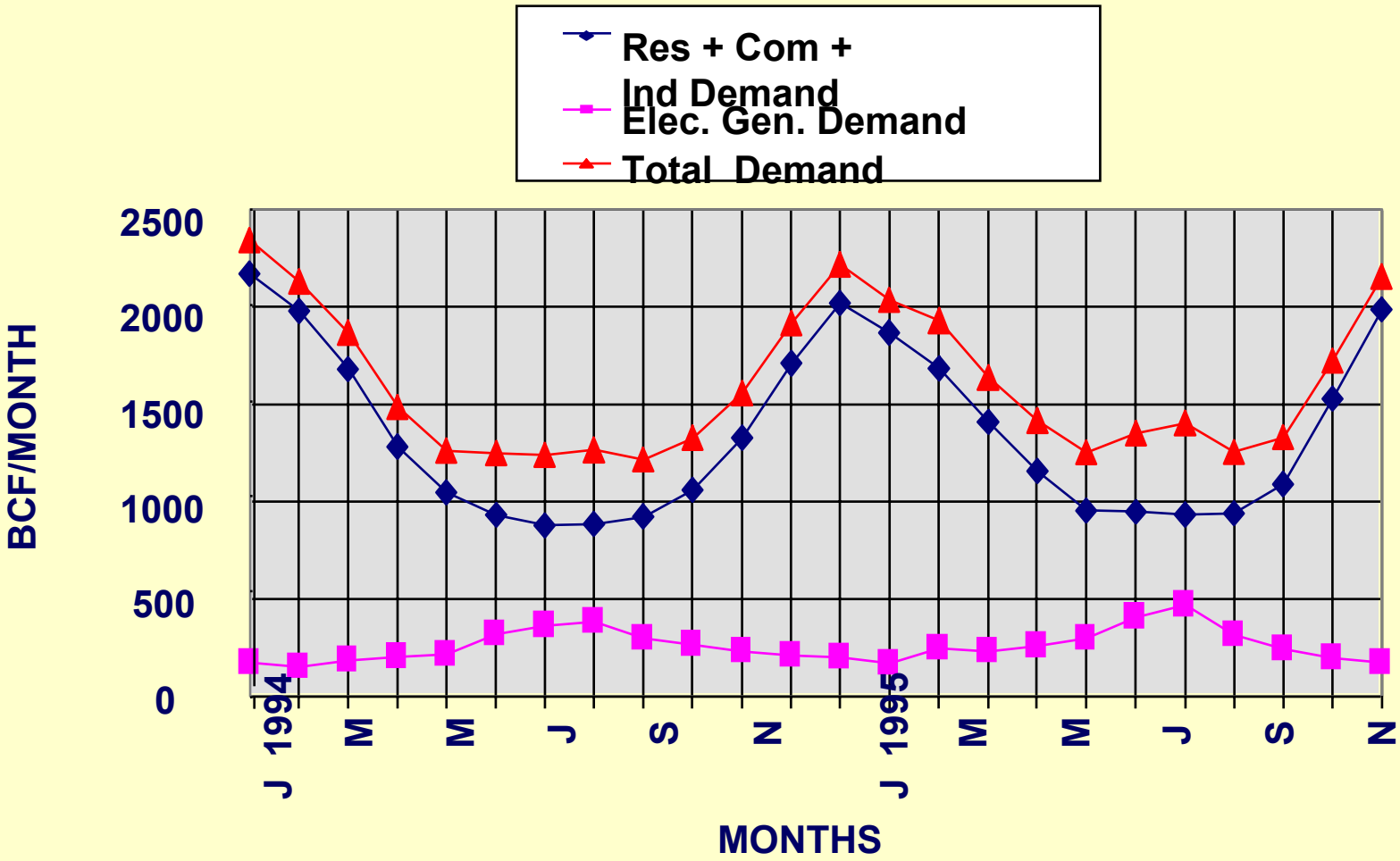


Pipelines
Natural Gas Transportation Service



There are:
110 Interstate Pipelines
(51 classified as majors)
with
190,000+ miles of
Transmission Lines

U.S. Monthly Demand for Natural Gas



Note: High deliverability needed for electrical power generation (multiple cycling of storage)

Central Questions

(1) Why are vertical affiliations of interest in the natural gas industry? Which affiliations are of most concern?

(2) How do FERC's open access rules and standards of conduct address vertical issues?

(3) What issues deserve further study?

History of North American Natural Gas Market

- Brief History (Sources: Chambers, Sturm, Global Competition Review)
- 1938, Congress passed the Natural Gas Act to protect the public interest, Federal Power Commission (FPC) to oversee
  - Section 7(c): Pipelines needed to obtain certification before
    - building transmission lines
    - abandoning old lines not in use
    - providing transmission services at approved transmission rates

History of North American Natural Gas Market

- Before 1985
  - regulated interstate gas pipelines provided a bundled service that included
    - transportation
    - transportation-related services (e.g., storage)
    - the natural gas itself
  - Customers paid the cost of gas based on long-term contracts between the pipelines and unaffiliated gas producers
  - Customers paid on a "pass-through" basis, i.e., no return on the commodity allowed for the pipelines (unlike electric power)
  - Thus, pipelines made no profit on the purchase and sale of gas

History of North American Natural Gas Market

- After WW II, great increases of pipeline transmission capacities
- **1954** Philips Decision, U.S. Supreme Court ordered the FPC to establish control over wellhead production prices (couldn't control sales price charged to consumers by pipelines)
  - Effects: cap or maximum price for producers
  - Intrastate market unregulated by FPC (only local governing body, no authority to set price controls)
  - Price of natural gas was market-based, high demand➔intrastate pipeline more profitable to producers
  - Also, producers didn't have section 7(c) admin costs with intrastate pipelines

History of North American Natural Gas Market

- Mid 1960's, postwar pipeline boom ended, gas transmission network matured
- 1970's, federal regulation of the industry induced shortages, curtailments
  - During several extreme winters of the 1970s, regulated interstate market had shortages
  - Estimates of very high oil prices ($100/barrel)
  - Unregulated intrastate market has a lot of gas

History of North American Natural Gas Market

- 1978 Congress reversed the Philips decision by passing the Natural Gas Policy Act (NGPA)
  - FERC was established
  - Reformed wellhead natural gas price controls
    - FERC used a preset formula that allowed wellhead prices to rise
    - production rose dramatically

History of North American Natural Gas Market

- Outlined the need to restructure distribution and sales through "open-access" to the market areas
  - Unforeseen jurisdictional and bureaucratic problems, open-access to the marketplace didn't happen
  - Questions about how to restructure the services provided by the pipelines and distribution companies to increase market competitiveness
  - Natural Gas Wellhead Decontrol Act (1989) amended NGPA and deregulated the price of natural gas sales at the wellhead
  - Pipelines contracted for large amounts of long-term gas using high incentive prices provided by the Natural Gas Policy Act of 1978

History of North American Natural Gas Market

- 1980's, pessimism continued based on stagnant demand
- Mid 1980's
  - No more gas shortages
  - Oil prices not as high as expected
  - Dual-fired industrial customers could switch fuels

History of North American Natural Gas Market

- Problems with high-cost gas commitments made in the late 1970s and early 1980s
- Market prices declined, production from older, low-priced supply sources dropped
- Meanwhile, the volume of high-priced contracted gas was increasing
- Cost-of-service rules, average cost of all gas purchased a pass-through item in resale rates=> customers were getting higher rates
- Some reasons for this, many post NGPA contracts had the pipeline buy all that the producer chose to deliver from reserves

History of North American Natural Gas Market

- Basically, it was a stranded costs problem
- Pipelines and producers absorbed the stranded costs
  - More than 80% of the total settlement cost ($40 billion or so), paid by the producers and pipelines
  - Their options were limited given that their customers had other choices than to go with the old contracts
- Contractual commitments based on earlier energy crisis mentality, consumers not seeing a lot of savings

History of North American Natural Gas Market

- FERC saw the problem as poorly functioning market signals, took actions to make ignoring these signals more severe
- **1984, FERC Order 380**: outlawing contractual provisions in which customers agreed to pay for supplies even if no delivery
- Thus, pipeline customers free to seek out low-cost supplies and avoid paying high-cost gas from earlier contracts

History of North American Natural Gas Market

- **Open Access Rules FERC Order 436 (1985), Order 500 (1989)**: pipelines encouraged to give equally favorable terms to existing customers and new direct purchasers
  - Pipelines to continue buying gas from producers and selling to end users as done before
  - Also allow producers and end users to obtain contracts with the pipelines for capacity for their own use (e.g., for producers and end users to transact directly)
  - Rules established for nominations (reserving capacity) and allocations (segregating and measuring) of natural gas
  - Things work ok unless there is a pipeline imbalance (imposed penalties)
  - Development of firm and interruptible services for shippers

History of North American Natural Gas Market

- **FERC Order 636 (1992) The Restructuring Rule**
  - Unbundling of services by interstate pipelines
  - Natural gas buyer can choose to buy gas from a supplier at one location, transport it along a pipeline a short distance (lower transportation rate), and receive the volumes
  - By the mid 1990's natural gas markets mostly deregulated, popularity of usage increased (clean & inexpensive fuel)
- **FERC Orders 888, 889 (1996)**
  - Promoting wholesale competition through open access, non-discriminatory transmission services by public utilities
  - Recovery of stranded costs by public utilities and transmitting utilities
  - Standards of conduct developed for pipelines and marketer affiliates

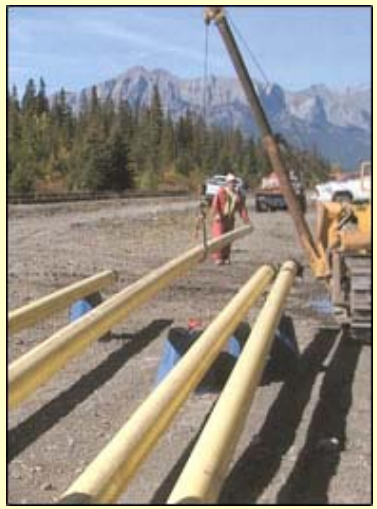
History of North American Natural Gas Market

- Summary of New Market
  - Buyers could purchase gas as a commodity at a commodity-only price
  - Other aspects of the traditional merchant service could also be obtained when needed from the pipeline supplier who was contractually bound
  - Pipelines and other marketers complemented each other
    - Pipelines provided peak-day reliability
    - Marketers provided the commodity
    - Marketers and direct purchasers did well since they got a “free ride” on other necessary services
  - In 1987, gas cost $2.14/Mcf, in 1996 it cost $2.24/Mcf
  - According to the American Gas Association (AGA), transmission and distribution costs dropped from $2.20 to $1.40/Mcf
  - Retail prices for natural gas for all sectors dropped 18% in this period

History of North American Natural Gas Market

- Summary of New Market
  - FERC regulates transactions between a natural gas pipeline and its marketer affiliates
  - Goal is to provide equal access to the pipeline transportation system for affiliated as well as non-affiliated shippers
  - Generally, FERC protects non-affiliated shippers from discriminatory treatment in the transportation aspects of natural gas
    - Post information by the utility on their website, all shippers get the same general transportation information
    - Tariff provisions equally applied and enforced to all
    - Requests treated the same from affiliated and non-affiliated shippers
    - Utility cannot disclose to its affiliates information received from a possible or actual non-affiliated shipper
    - All discounts offered to affiliates must be posted on the utility's website and offered to similarly-situated non-affiliates

Pipelines



- **Transportation Contracts**
  - Firm transportation
  - Interruptible transportation
  - commodity charge ($/MMBtu), per gas transported, varies by time of year, distance travelled
  - additional surcharges (depending on the pipeline)
  - “in kind” for fuel charges (fuel losses for compressors)
  - Firm only, also a reservation charge, independent of actual usage
  - Want to maintain sufficient pressure in the pipelines (therefore can’t have all firm)

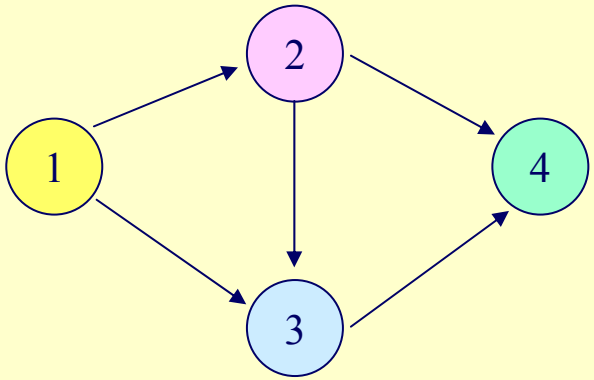
Transportation

- **Transportation Contracts**
  - Rates that interstates can charge for transportation approved by FERC
  - Rates that shippers are willing to pay ultimately determine what the pipelines can charge
  - In general, pipelines sell long-term firm capacity when demand is expected to be high, and hold off when demand expected to be low
  - Then need to find interruptible contracts to fill out the capacity of the pipeline
  - Shippers can have multiple interruptible contracts on different pipelines
  - To attract these interruptible customers, pipelines often discount their maximum published commodity tariff rates (depending on the supply-demand balance for their system)

Transportation

- **Transportation Contracts**
  - Example: if a particular pipeline segment lost pressure due to a change in supply or demand, pipeline contacts active interruptible shippers with discounted commodity transportation rates for that segment
  - More generally, when excess capacity is present and not needed for operational purposes, pipelines will negotiate the commodity transportation rates on a case-by-case basis
  - Capacity release and trading
    - Firm shipper can assign its firm capacity on a pipeline to a third party willing to pay all or some portion of the reservation charge, commodity charge or other charges
    - Capacity releases can be negotiated exclusively between shippers or through a closed bidding process (bids are % of transportation rates, highest bid wins)

Marketers

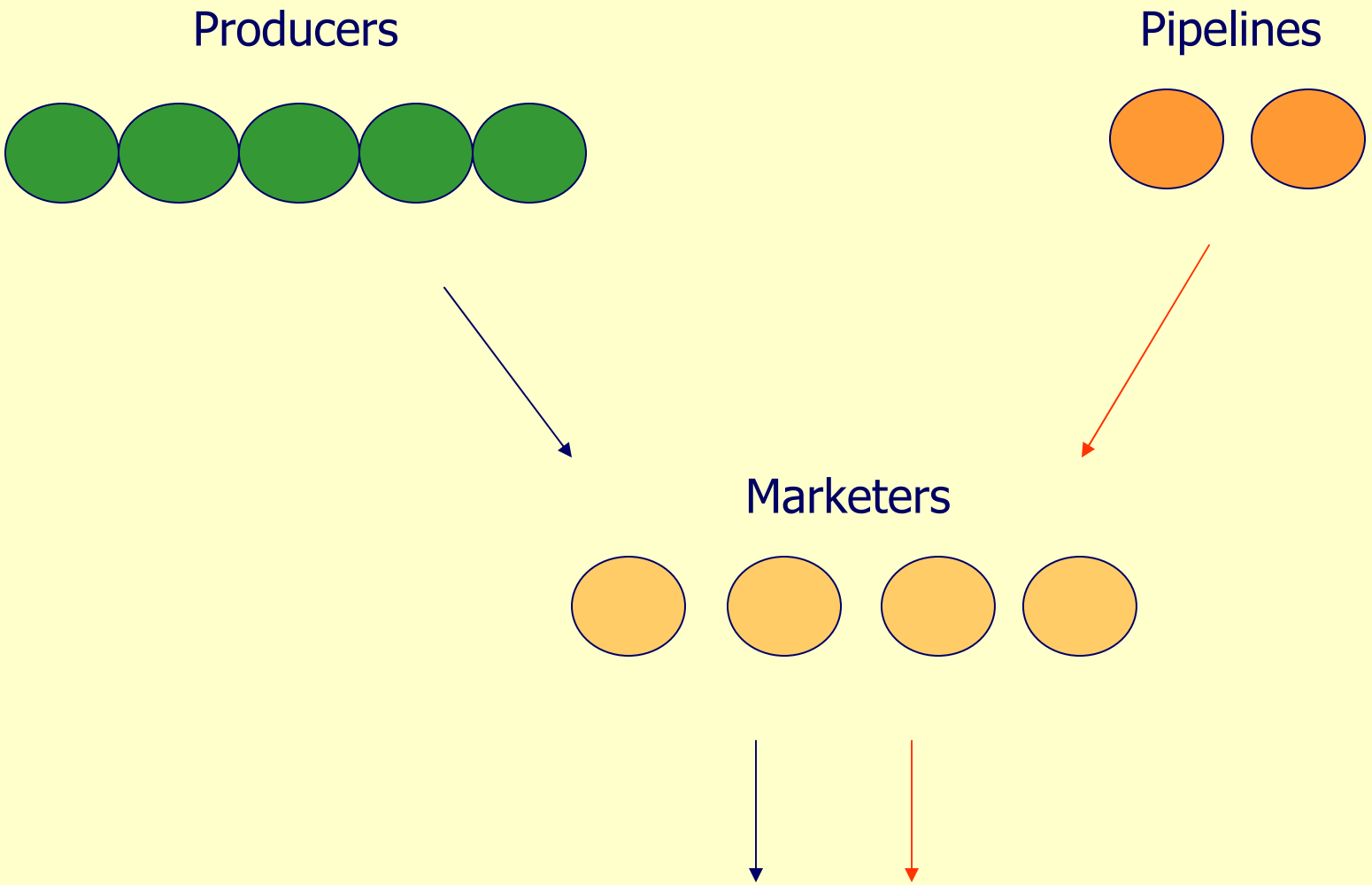


- **Marketers**
  - Unregulated
  - Can provide services such as acting as a buying or selling agency for large industrial customers or producers, respectively
  - Trading function (any company is free to buy and sell to anyone as a result of deregulation)
  - Can contract for pipeline capacity on almost any pipeline system

Vertical Affiliations and the Natural Gas industry

(1) Why are vertical affiliations of particular interest in the natural gas industry? Which vertical affiliations are of most concern?

(2) Are open access rules and standards of conduct likely to prevent most types of affiliate abuse? If not, what behaviors are likely to persist?


Producers
Pipelines
Marketers

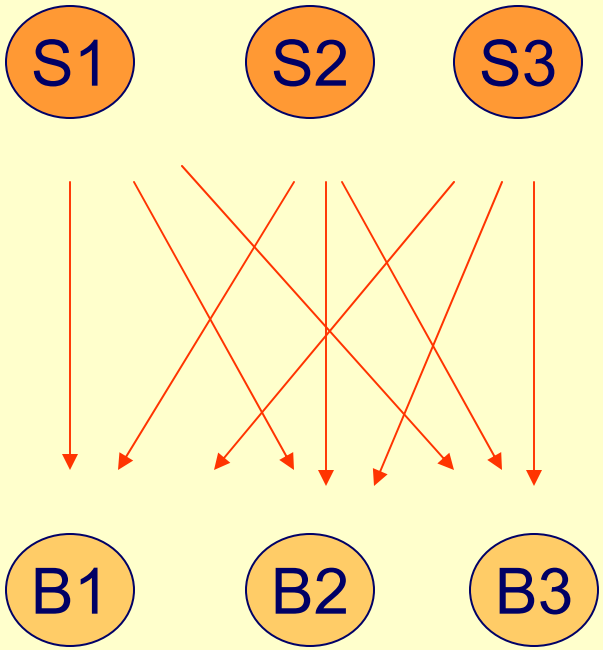
Motivations for vertical affiliation

- Productive / technological efficiencies
- Reductions in transactions costs of external exchange
- Market imperfections (imperfect competition, asymmetric information)

Survey: Perry (1989)

Vertical foreclosure debate

Upstream Suppliers



Downstream Buyers

What happens to prices and allocations of inputs when a buyer and a supplier merge?

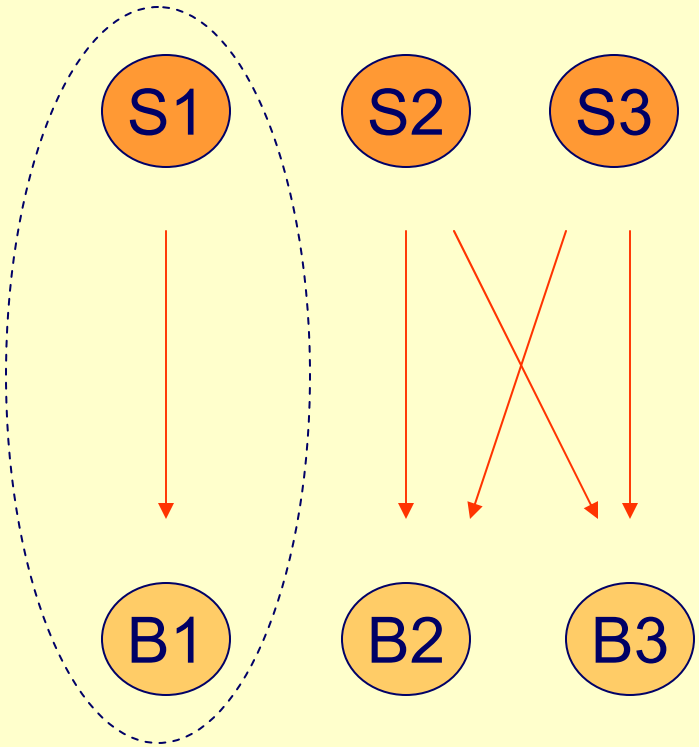
Vertical foreclosure:

Vertical merger may reduce the access that a non-merged buyer has to upstream suppliers.

e.g. In the absence of regulation, non-affiliated marketers might have reduced access to pipeline capacity & could face higher prices.

One side of debate – Chicago School

- A vertical merger may have benefits – reduced transaction costs, better incentives for specific investments, etc.
- Foreclosure need not occur. A merged supplier will sell inputs to external buyers whenever they value the input more than the internal buyer.
- Even if a merged supplier reduces supply to an external buyer, other suppliers won't necessarily raise their prices if they face reduced demand.



Bork (1978) – vertical mergers do not increase market share and so do not change a firm's market power

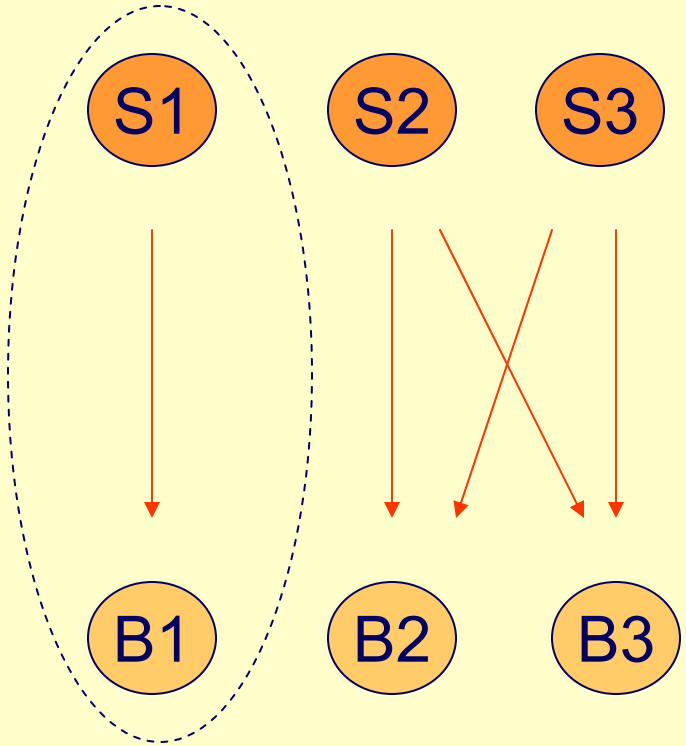
Other side of debate – "raising rival's costs"

- Vertical foreclosure can occur – merger changes merged supplier's incentive to sell inputs to outside buyers, because of competition in final goods markets.

- Effect on prices and allocations depend on the nature of competition.

Salinger (1988), Ordover, et. al. (1990), Hart and Tirole (1990)

Salinger (1988): Cournot competition model

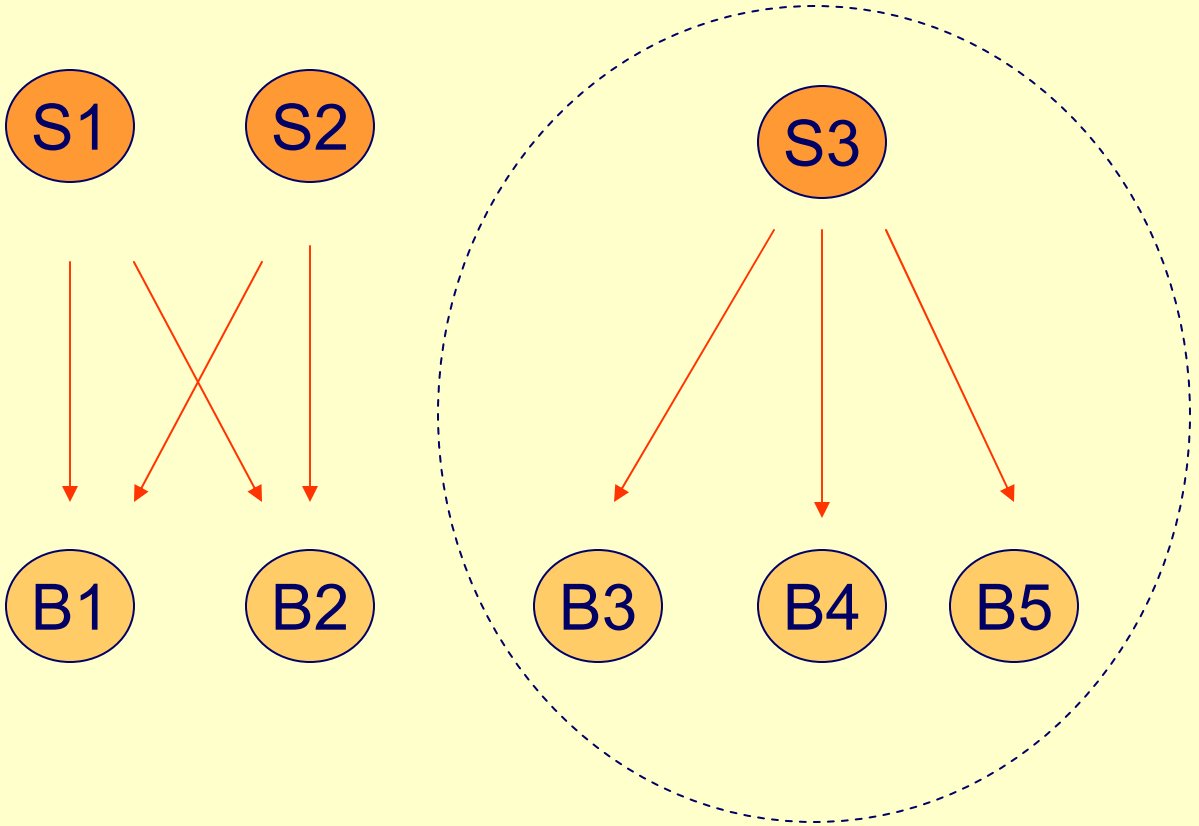


- merged buyer expands output
- non-merged buyers contract output
- input price may go up or down
- final good price may go up or down

Perhaps the most serious anti-competitive concern is that foreclosure could result in the exit of non-affiliated firms.

Hart and Tirole (1990)

Other Vertical Affiliation Possibilities



- Restructuring and open access (FERC orders e.g., 636, 888).
- Regulation addresses concerns about vertical foreclosure.
- Allow the benefits of vertical merger to be realized while at the same time avoiding foreclosure.

Case of El Paso Natural Gas

- California energy crisis of winter 2000-2001
- PUC of State of California v. El Paso Natural Gas Company (EPNG) and El Paso Merchant Energy (EPME)

Complaints:

- Sharing of information violated standards of conduct for pipelines and their marketing affiliates
- underutilization of pipeline capacity by EPME
- withholding of pipeline capacity by EPNG

- EPNG and EPME privately negotiated a discount that may have helped EPME to place the winning bid for large blocks of pipeline capacity to California market.
- Other marketers were not informed about the discount until after the open season for the capacity ended.

- EPME bid more for all of the capacity than the aggregate of all other bids for parts of the capacity.

- But, non-affiliated marketers might have been willing to bid more for the capacity if they had known about the discount.

Asymmetric information and vertical integration

- Arrow (1975) – information about input prices is shared
- Crocker (1983), Riordan and Sappington (1987) – agency costs for obtaining information are reduced
- Riordan and Salop (1995) – vertical information sharing facilitates horizontal collusion
- Hughes and Kao (2001) – non-integrated firms' concerns about proprietary information sharing may reduce incentives for a vertical merger
- Vives (2002) – welfare losses due to asymmetric information outweigh welfare losses due to market power

- New theoretical analyses may be useful to study information sharing under vertical merger and to consider welfare impact.

- FERC order 2004 strengthens and clarifies regulations about information sharing between transmission providers and energy affiliates, but it may be difficult to monitor abuses.

Research directions:

- Build market equilibrium models of the natural gas sector using game theory via the nonlinear complementarity and variational inequality problems
- Determine where asymmetric information is likely to matter most in natural gas markets
- Develop models of vertical merger for natural gas that can analyze asymmetric information and imperfect competition
- Analyze impact of regulatory policies directed at asymmetric information

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