Contract Duration and Relation Specific Investments: Empirical Evidence from Coal Markets

By Paul Joskow, 1985, in *American Economic Review*

Classic paper

By: Denny Tran, Erik Fernandez, Anita Yi

Research question

- Are relation specific investments determinants of the contract length (duration) between coal suppliers (mines) and electric utilities (downstream buyers of upstream mines)?
- Assumption: Risk aversion is not an important determinant of the structure of vertical relationships in this industry

Terms Defined

- **Risk Aversion**: A description of an investor who, when faced with two investments with a similar expected return (but different risks), will prefer the one with the lower risk.

- **Spot Market**: A commodities or securities market in which goods are sold for cash and delivered immediately.

Contract Duration: The length of time to which the parties agree *ex ante* (before the event) to abide by the terms of a contract.

Transaction Cost: A cost incurred in making an economic exchange.

Three types of transaction- specific investments

- A) Site Specificity
- B) Physical Asset Specificity
- C) Dedicated Assets

These types of transaction- specific investments influence the duration of the contract.

Site Specificity

- Site Specificity: The buyer and seller are in a "cheek-by-jowl" investment relationship with one another to minimize inventory. Once sited the assets are highly immobile.
- This type of transaction-specific investment is especially vulnerable to ex post opportunism, therefore long term contracts are a necessity.

Physical Asset Specificity

- Physical Asset specificity: When one or both parties to the transaction make investments in equipment an machinery that involves design characteristics specific to the transaction which have lower values in alternative uses.
- Ex post opportunism problems are related to coal quality, least cost supply technology and transportation alternatives.

East versus West

- East
- Homogeneous coal quality
- Many small underground mining operations
- Small transport distances

- West
- Heterogeneous coal quality
- Large mining operations
- Large transport distances

Long duration contracts are preferable in the west versus short contracts in the east.

Dedicated Assets

- Dedicated assets: General investments by a supplier that would not otherwise be made but for the prospect of selling a significant amount of the product to a particular costumer.
- Contract Duration depends on the quantity contracted for. The greater the quantity the longer the contract will be.

Williamson (1983)'s variables of interest in coal-utility vertical relationships:

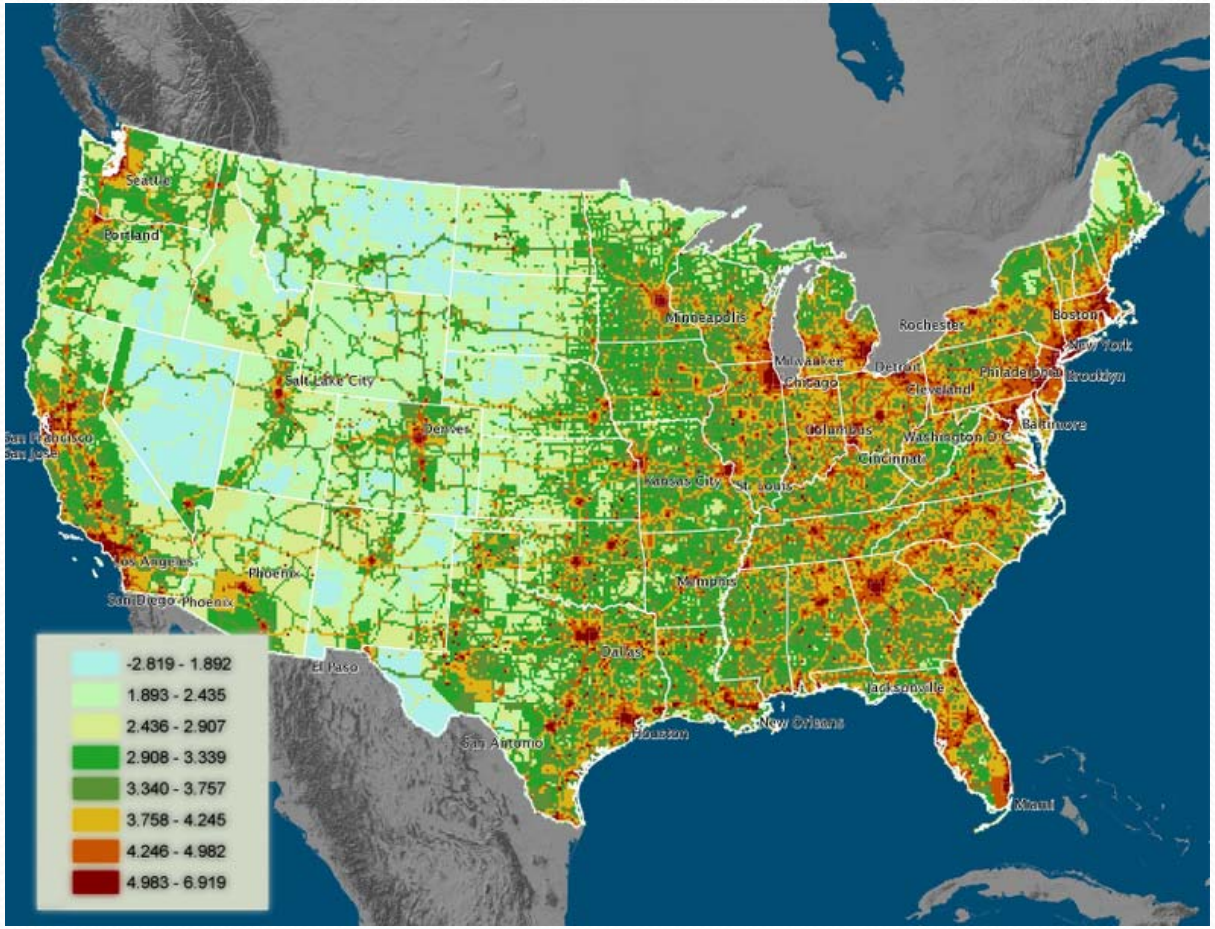
->Variables defined as RHS determinants of contract length fro the empirical analysis

- Site specificity → •Mine mouth
- Physical asset specificity → •Regional dummy
- Dedicated assets → •Annual quantity
- Human asset specificity

Left hand side:

Contract duration= time agreed ex-ante to abide btw parties

Location of coal in US



Source : Blake Shurtz, april 2008 email

Table 3: Contract Duration

TABLE 3—CONTRACT DURATION[a]

Independent Variables	277 Sample			169 Sample					*2SLS* Estimate Duration
	DURATION (1)	*DURATION* (2)	*LOG-DURATION* (3)	*DURATION* (4)	*DURATION* (5)	*LOG-DURATION* (6)	*DURATION* (7)	*DURATION* (8)	(9)
QUANTITY	0.4289	–	–	0.4091	–	–	–	–	–
	(0.0373)			(0.0040)					
QUANTITY-SQUARED	−0.0024	–	–	−0.0020	–	–	–	–	–
	(0.00030)			(0.00003)					
LOG-QUANTITY	–	4.4206	0.5057	–	4.2080	0.4942	4.2022	4.2057	5.1066
		(0.3742)	(0.0425)		(0.4069)	(0.0453)	(0.4617)	(0.4084)	(0.812)
MINE-MOUTH	16.3300	16.4317	0.5104	15.9583	16.2300	0.4616	16.3432	16.2284	15.4391
	(2.0496)	(2.0045)	(0.2279)	(1.9106)	(1.8421)	(0.2050)	(1.9426)	(1.8477)	(1.968)
MIDWEST	3.4267	3.8795	0.5154	2.7832	2.7843	0.5785	2.7317	2.7848	2.4268
	(0.9682)	(0.9821)	(0.1116)	(1.0928)	(1.1032)	(0.1228)	(1.1295)	(1.1065)	(1.153)
WEST	5.3550	5.2033	0.6142	5.9856	5.6108	0.6844	5.6456	5.6391	4.8916
	(1.357)	(1.1641)	(0.1323)	(1.2346)	(1.2586)	(0.1401)	(1.3406)	(1.2751)	(1.394)
PLANT PROPORTION	–	–	–	–	–	–	0.9729	–	–
							(1.9806)		
UTILITY PROPORTION	–	–	–	–	–	–	−2.0570	–	–
							(2.5832)		
PLANT/UTILITY	–	–	–	–	–	–	–	−0.2246	–
								(1.4265)	
Constant	3.6770	−0.7902	0.6014	3.9334	0.0155	0.6242	−0.0146	0.1157	−1.8922
	(0.6586)	(0.9579)	(0.1089)	(0.8109)	(1.0917)	(0.1215)	(1.0978)	(1.2665)	(1.852)
Corrected *R*-squared	0.61	0.60	0.51	0.71	0.70	0.61	0.70	0.70	–
Observations	277	277	277	169	169	169	169	169	169

[a] OLS estimates. Standard errors of coefficient estimates are shown in parentheses.

Data

- Cross-section for year 1979
- 277 observations of coal vertical contracts
- Cross-sectional variation in contract length in the data:
  - 15 % vertically integrated mines and utilities
  - 15% spot market transactions
  - 70% contracts with length between 1 and 5 years

Table 3 Analysis

OLS Estimates (Table 3):

- A Mine mouth plant has contract length predicted to be 16 years longer than those contracts of other plants
- Regional location matters, and east coast contracts have 3-5 years shorter duration than west and mid west
- If Annual quantity contracted increases by an extra 1 million tons, it leads to a 13 year increase in contract duration

- This shows evidence that there exists quasi-rents associated with asset specificity, site specificity, etc in transactions between coal mines and utilities, and more for coal mines and mine mouth power plants (site specific)

Conclusion

- The results provide strong support for the view that buyers and sellers make longer commitments to the terms of future trade at the contract execution stage, and rely less on repeated bargaining, when relationship-specific investments are more important.

West vs. East Coast Contracts

West Coast

- Longer Contracts
- Market power
- Fewer Mines
- Coal not homogeneous
- Higher Transportation Costs

(Poor Transportation Alternatives)

East Coast

- Shorter Contracts
- Spot market
- Lots of mines (Greater Competition)
- Homogenous coal
- Better railroad system

Main Points

- Contracts basically simply get longer as we move from East to West.
- Mine-mouth plants tend to have longer-term contracts.
- The greater the annual quantity of coal contracted for, the longer the duration of a contract.

The End