working paper
department
of economics

THE PERFORMANCE OF LONG TERM CONTRACTS: FURTHER EVIDENCE FROM COAL MARKETS

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No. 517 February 1989

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The Performance of Long Term Contracts: Further Evidence From Coal Markets

By

Paul L. Joskow[1]

Introduction and Summary

In three recent papers I examined the nature of vertical relationships between electric utilities and their coal suppliers (Joskow, 1985, 1987, 1988a). I found that the structure of these vertical relationships is significantly affected by the importance of relationship specific investments made by buyers and sellers. Opportunities to minimize expected costs by making relationship specific investments often makes it desirable for utilities and their coal suppliers to enter into long term contracts (Joskow, 1987) or, in the case of many mine-mouth generating plants, to vertically integrate into coal supply (Joskow, 1985). These results provided additional support for the existance of an important relationship between asset specificity and the structure of vertical relationships (Williamson (1985), Klein, Crawford and Alchian (1978), Hart (1988), Joskow (1988b)).

A major challenge in structuring long term coal supply contracts involves the specification of price and quantity adjustment provisions that both guard against opportunistic behavior and provide for flexibility to adapt to changing market conditions as the contractual relationship plays itself out over time (Joskow (1988a) and Hart and Moore(1988)). Long term coal supply contracts negotiated in the late 1960's and 1970's typically handled the price determination problem by specifying a

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[1]Professor of Economics, MIT. Financial support from the MIT Center For Energy Policy Research, the Olin Foundation, and the MIT Energy Economics Research fund is gratefully acknowledged. I want to thank Jean Tirole, Oliver Hart, and Gregory Werden for helpful comments. This paper was written while the author was an Olin Visiting Scholar at Harvard Law School.

base price and an adjustment formula to change the base price over time. These formulas provide for adjustments to base prices using a pre-specified weighted average of the input price indices that were expected to affect changes in the long run total costs of producing coal (excluding changes in user costs and related economic rents) over time.[2] The contracts also typically specify a fixed schedule of quantities that the seller is obligated to supply and the buyer is obligated to take at the prices specified in the contract. The buyer often has the option to increase or decrease the quantities taken within a small band around the contract quantities, but the contracts have a clear "take-or-pay" character to them. Given the "take or pay" character of these contracts, I argued that the price adjustment formulas chosen were reasonably well adapted to adjusting contract prices to reflect changes in market values associated with supply side changes that increased or decreased the long run total cost of producing coal. This tends to minimize contractual breakdowns arising from opportunities the buyer or seller may have to breach their agreements in order to deal more profitably with third parties and helps to make these long term contraccts "self-enforcing." However, these adjustment provisions appear to be less well adapted to adjusting prices to reflect demand side shocks that changed the market value of coal more or less than the long run total cost (excluding changes in scarcity rents) of producing it.

These adjustment formulas appear to have been reasonably successful in responding to changing market conditions in the 1970s and early 1980s. While some upward price rigidity was observed (Joskow 1988a, pp. 78-81)), on average, prices tracked changing market conditions fairly closely. Contractual relationships generally did not break down despite fairly substantial upheavals in coal markets. However, I

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[2]They also provided for adjustments for other exogenous factors, such as new mining regulations, that could increase the cost of producing coal.

suggested (Joskow, 1988a, page 81) that changes in coal markets that took place in the mid-1980's would provide further insights into price adjustment behavior and incentives for breaches of contractual promises in these "old" contracts; in particular the behavior of contract prices during this later period would provide an opportunity to examine downward price rigidity as opposed to the upward price rigidities that had been the focus of the work that I had done up until that point.

The contracts and transactions price data that were available to me in my earlier work (contracts executed between the early 1960's and 1979 and transactions prices associated with these contracts for 1979, 1980, and 1981) were characterized by rising nominal coal prices and generally rising or stable real coal prices over time. During this time periods coal markets were expanding and market values appear to have reflected long run changes in the costs of producing coal. Market dynamics were thus reasonably well matched with the price adjustment formulas contained in long term coal contracts. However, as I discuss in more detail below, in the mid-1980's domestic coal prices declined sharply. This decline reflected primarily demand side rather than cost side shocks. The price adjustment provisions contained in the long term contracts that I examined do not appear to have been designed to reflect changes in market values associated with demand side shocks, however. Data for the period of the coal market's decline were not available when my earlier work on price adjustment was completed. Contract specific transactions price data for 1984 and 1985 are now available, however.

This paper extends my previous work on price adjustment in long term coal contracts (Joskow 1988a) to cover the years 1984 and 1985 (and to a lesser extent, 1986 and 1987 as well). I am interested in two related sets of questions. First, how did actual transactions prices for coal sold pursuant to "old" long term contracts (contracts negotiated before 1980) adjust to changing market conditions

after 1983 when the nominal and real market value of coal declined significantly? Were old contract prices rigid downward or did they adapt quickly to the new market conditions? Second, what were the roles of the formal adjustment provisions, renegotiation and litigation in determining transactions prices, quantities and the durability of existing contractual relationships?

To answer the first set of questions I examine the behavior of transactions prices associated with sales made under the "old" long term coal contracts between 1981, the last year covered in my previous work, and 1984 and 1985, the most recent years for which data are available for these "old" pre-1980 contracts. The empirical analysis presented is quite simple. I started with the "old" contracts used in my previous work and extended the transactions price information for these contracts to include transactions prices for 1984 and 1985. This allows me to determine how prices associated with these "old" contracts changed between 1981 and 1984/1985. These movements in transactions prices are first compared to a rough estimate of the price changes that would have been expected if contract prices moved along with the changes in the wage and price indices that are typically incorporated in the price adjustment provisions written into pre-1980 long term coal contracts contracts. I then compare changes in transactions prices observed for these long term contracts with "average" coal transactions prices for all U.S. coal production during the 1981 to 1985 period. Next, I collected data for "new" coal contracts signed by investor-owned utilities in 1984 and 1985 (the "new" contracts). These contracts reflect prevailing market conditions in 1984 and 1985. Transactions prices for coal with comparable attributes associated with the "old" contracts are then compared with transactions prices associated with the "new" contracts to determine whether there is significant downward price rigidity.

These simple empirical analyses indicate that the transactions prices

associated with the "old" contracts track changes in market conditions during this period of coal market decline quite poorly. I observe large differences in prices between "old" and "new" contracts. That is, there is substantial downward price rigidity associated with long term contracts during this period of market decline. It is also fairly clear that typical published coal price indices based on average transactions prices for all coal sales are imperfect indicators of short run changes in prevailing market conditions because of downward price rigidities associated with older contracts which rely on conventional base price plus escalation provisions to determine transactions prices.

The large disparity between transactions prices associated with "old" and "new" contracts naturally leads to questions about the reactions of buyers and sellers to the new market conditions. If buyers could contract de novo for coal supplies in 1984 or 1985 they would obtain much more favorable price terms than they were receiving by performing on their old contracts. However, there ability to renegotiate there existing contracts is likely to be constrained by two factors. First, they have signed contracts with detailed performance provisions. If they do not accept delivery, they could be liable to pay substantial damages to the seller. Second, even in the absence of a legally binding contract, investments in relationship specific capital may impose switching costs on the buyer and give the seller some bargaining power to sustain a price higher than would have been achievable if the entire relationship were negotiated de novo in 1984 or 1985.

The final section of the paper discusses opportunities and incentives for contract terminations, breaches and voluntary renegotiation and presents some evidence regarding the incidence and nature of contract renegotiation, contract buy-outs, and litigation resulting from breach of contract after 1983. Given the fairly rigid quantity provisions in long term contracts there appear to be a limited number

of circumstances where voluntary mutually satisfactory ex post renegotiation is likely. However, there appear to be substantial incentives for buyers to breach their agreements if the terms and conditions specified in formal contracts cannot be easily enforced. If these incentives lead to contractual breakdowns, it would raise serious questions about the ability of long term contracts to protect buyers and sellers from opportunistic behavior and inefficient ex post haggling over the distribution of economic rents. While there does appear to be a significant increase in renegotiation, buy-out and litigation activity in the mid-1980's, significant contractual breakdowns were not a major problem. It seems that a large fraction of the relatively few significant downward price renegotiations reported are truly voluntary and do not reflect imperfections associated with writing, monitoring and enforcing contractual provisions. Despite the large differences between "old" and "new" contract prices, there are relatively few instances of complete breakdowns in contractual relationships leading to premature termination and litigation. Instead, renegotiation reflects primarily flexibilitity provided for ex ante in the contracts themselves or mutually beneficial adjustments in contractual provisions that lead to increased output and contract prices closer to market values.

Background

As I discussed in my previous work on price adjustment in long term coal contracts (Joskow 1988a), during the period 1965 to 1981 the domestic coal market expanded steadily and was subject to price and cost increasing shocks on both the demand and supply sides of the market. The average nominal price of coal in the U.S. increased by a factor of about six between 1965 to 1981 (See Joskow 1988a, Table 2, column 2). The average real price of coal in the U.S. increased by roughly 40% between 1965 and 1973, nearly doubled between 1973 and 1975, following the

dislocation in energy markets following the oil Arab oil embargo, was roughly constant until 1979, and declined by about 6% between 1979 and 1981 (See Joskow 1988a, Table 2, Column 3).

Discussions of coal market conditions in the trade press indicate a significant "softening" in coal markets beginning in roughly 1983. Depressed market conditions prevailed until at least 1987.[3] These discussions refer to a decline in utility contracting for new long term supplies and a decline in prices in both spot and contract markets. Aggregate U.S. Coal production increased by only about 7% between 1980 and 1986, but almost all of this increase was in the Western region.[4] Coal production in the East and Midwest was stagnant between 1980 and 1986. There was a large decline in production in 1983 which accompanied the onset of the depressed market. Capacity utilization in the coal industry was significantly below previous peak levels over the 1983-85 period.[5] The major factors affecting the domestic coal market after 1982 appear to have been (1) a dramatic reduction in orders for new coal boilers by electric utilities[6]; (2) falling oil and natural gas prices, especially after

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[3] "Illinois Basin Spot Prices Go Nowhere; Contracts Will Allow Major Spot Buys," Coal Week, May 25, 1987, p.3; "Long Term Coal Contracts Will Return, But They Will Provide New Contract Flexibility, Coal Week, August 12, 1985, p. 7; "Detroit Edison Evaluates Bids," Coal Week, April 8, 1985, p. 4; "Long Term Strategy Pays Off For Companies Bucking Current Slide," Coal Week, November 28, 1983, p. 7; "Slow Times Out West," Coal Week, August 15, 1983; "Dismal Market Is Utilities' Trump Card in Contract Talks," Coal Week, February 7, 1983, p. 2; "Cost and Quality of Fuels For the Electric Utility Industry 1986, Energy Information Administration, U.S. Department of Energy, p. 4.

[4] Coal Production 1986, Energy Information Administration, U.S. Department of Energy, (DOE/EIA-0118(86), page 14.

[5] Economic Report of the President, February 1988, page 505.

[6] Between 1970 and 1983 on the order of twenty to thirty new base-load coal units entered service in each year. In 1983 only thirteen new units entered service. In 1988 only two units are scheduled to enter service and an average of three units per year are expected through 1992. Given the lead times for new generating units, this is consistent with a dramatic reduction in orders for new coal units in the early 1980s. Since contracts for coal for new generating units are generally made several

1984, affecting utility fuel utilization decisions around the country[7]; (3) the completion of additional coal mining capacity in the West developed in anticipation of more rapidly expanding demand and; (4) growing competition from foreign coal suppliers.[8]

The descriptions of the changing market found in the trade press are broadly consistent with the behavior of average U.S. coal prices during the 1983-87 period. Table 1 provides computations of the average rate of change in average U.S. coal prices at the mine in nominal and constant dollars for several time periods between 1975 and 1987. Figure #1 displays the levels of average U.S. coal prices (at the mine) in nominal and constant dollars between 1979 and 1987.[9] The average nominal price of coal peaked in 1982 and then began to fall. The real price of coal peaked in 1975, was roughly constant until 1979 and has declined since then. The rate of decline in real coal prices accelerated after 1982.

Unfortunately, the mine mouth coal price data that are generally published, aggregate together transactions for all contracts, regardless of vintage, along with spot market sales. The average coal price figures used in Figure #1 and Table #1 thus reflect all coal transactions made in each year---those associated with

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years prior to commercial operation, this is also consistent with a reduction in long-term contracting to supply new units. See "Two Utility Coal Plants to Enter Service in '88; Lowest Total Ever," Electric Utility Week, July 25, 1988, page 4.

[7]Nominal and real oil prices peaked in 1981 and then began to fall. Nominal and real natural gas prices peaked in 1984 and then began to fall. The big break in prices for both oil and gas began in 1985. U.S. Department of Energy, Energy Information Agency, Annual Energy Review 1987, page 25. See "Troubles in Wyoming Tell Tale of the West," Coal Week, November 3, 1986; "Oil and Gas Back Out Coal at Arizona Utility," Coal Week, November 10, 1986.

[8] "Market Watch," Coal Week, July 27, 1987, p.4 ; "Logistics Transforming Coal Market In Gulf Region," Coal Weeks, September 24, 1983, p.1; "Long Term Coal Contracts Will Return," Coal Week, August 12, 1985, p. 7.

[9]The GNP deflator was used to deflate the nominal prices using 1981=100.

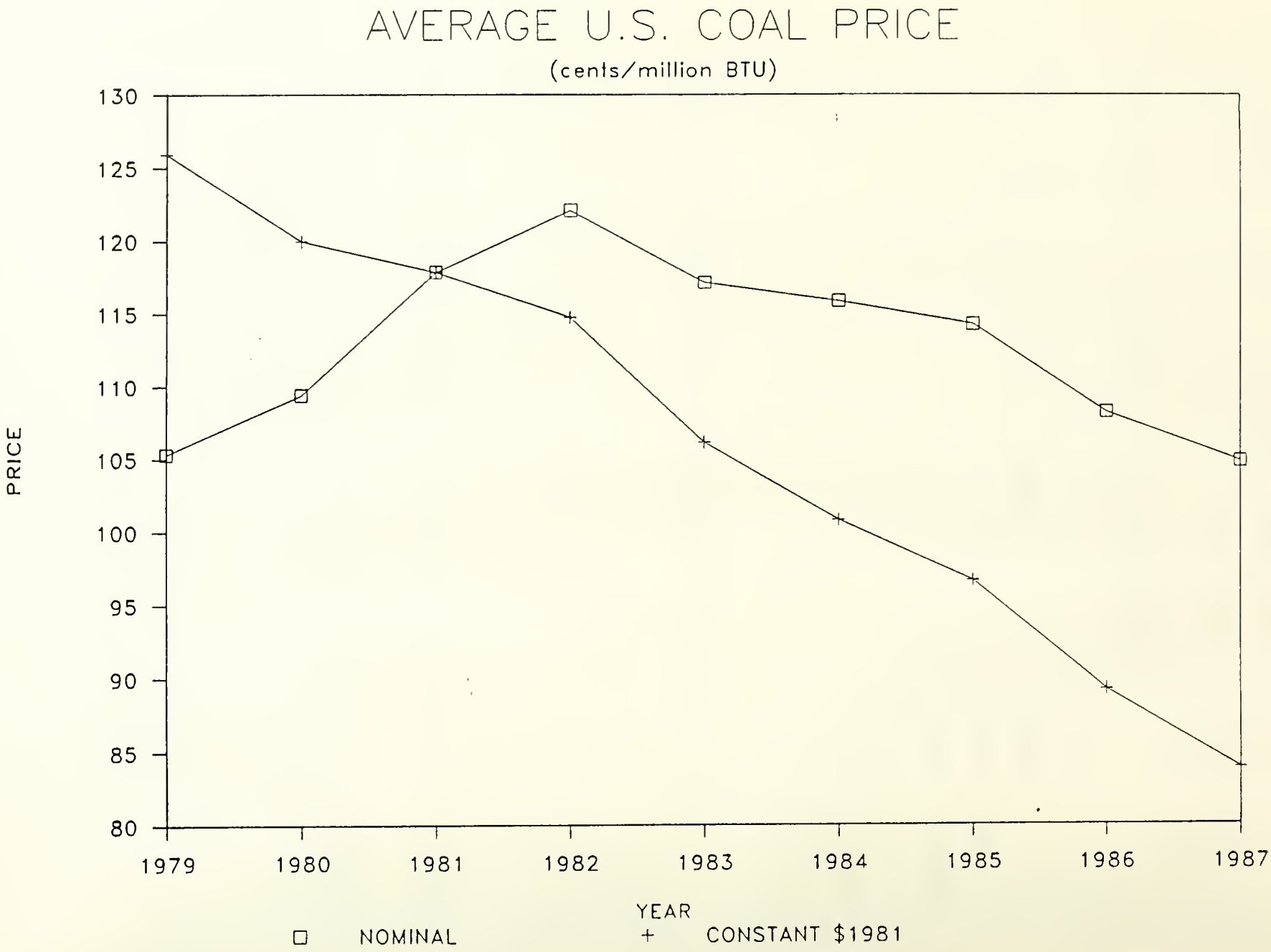
TABLE 1

Changes In Average U.S. Coal Prices At The Mine
(Average Annual % change)

Period	Nominal $	Constant $1981
1975-79	6.30%	-1.20%
1979-82	5.30%	-2.20%
1982-87	-2.80%	-5.70%

Source: Statistical Abstract of the United States, various years.

FIGURE #1


AVERAGE U.S. COAL PRICE
(cents/million BTU)
PRICE
130
125
120
115
110
105
100
95
90
85
80
1979
1980
1981
1982
1983
1984
1985
1986
1987
YEAR
NOMINAL
CONSTANT $1981

old contracts, new contracts, and spot market transactions. There is no reason, however, to believe that the disaggregated transactions prices for "old" and "new" contracts are equal to one another.

The long term coal contracts executed prior to 1980 (i.e. those in my original sample) generally have price adjustment features that rely on a base price plus escalation formula (BPE). The typical base price reflects prevailing market conditions at the time the contract was negotiated. The base price is then adjusted using an index composed of a weighted average of input price variables for wages, material and supplies, general inflations, etc. If the actual written provisions of these "old" contracts were binding on the parties and continued to operate as written, without renegotiation in 1984-85, the associated prices would not be expected to fully reflect the downturn in the market for new coal supply contracts, since the downturn is associated with significant excess capacity and downward adjustments in the expected future demand for domestic coal, rather than with declining input prices.

Absent renegotiation, prices for coal sold pursuant to the "old" contracts should probably have continued to rise in nominal terms during the mid-1980s period, rather than turning down along with the market. The primary escalators found in these contracts typically include a variety of components of the producer price index and a mining wage index (Joskow 1988a, pp. 55-60). Let's do some rough calculations. The average annual compensation for miners increased by about 25% between 1981 and 1985. During the same period of time the producer price index for intermediate materials, supplies, and components increased by only 4%. Assuming wages are roughly 50% of total costs this would imply an increase in nominal prices of about 15% between 1981 and 1985. Most of this nominal price increase should have occurred by 1984 since mining compensation increased by less than 4% in 1985, and the producer price index for intermediate materials, supplies and components declined

slightly between 1984 and 1985. This is consistent with roughly a 1-2% increase in contract prices between 1984 and 1985 due to escalation provision in existing contracts.[10] In short, if the escalation provisions in the "old" contracts are the primary determinant of transactions prices associated with these contracts during the 1984-85 period, we should expect to observe "old" contract prices rising despite the fact that the average market value of coal was falling.

Price Adjustment in "Old" Contracts

As I have already discussed, publicly available coal price series do not report transactions prices for contracts negotiated at different points in time. As a result, these price series do not make it possible to identify potential price rigidities associated with contracts of different vintages or to make inferences about the magnitude of price rigidity associated with long term contracts. However, by extending and augmenting the data set used in my previous work, I can shed some light on these adjustment characteristics. In this section of the paper I examine the pattern of actual transactions prices for coal between 1981 and 1985 sold pursuant to the "old" long term contracts used in my previous work. I first compare these price patterns with the price paths that would be expected if the typical escalation provisions contained in these contracts were determining transactions prices. I also compare the pattern of "old" contract prices with the changes in the published average nominal price series for all coal transactions discussed above. In the next

[10] These calculations are obviously very rough and are presented here to help to evaluate the comparisons in behavior between "old" and "new" contracts discussed below. Actually escalation formulas are more complex. Furthermore, productivity improvements could be reflected in aggregate contract prices through the determination of the wage component of the escalation provision. This would be most likely in contracts that treated wage changes on a cost plus basis rather than using a simple wage index. Productivity increases or decreases might also be passed along to buyers through adjustment provisions reflecting the costs of complying with government regulations.

section of the paper I compare 1984 and 1985 transactions prices associated with the "old" contracts with 1984 and 1985 transactions prices for a sample of "new" contracts signed in 1984 and 1985.

My previous work on long term coal contracts (Joskow 1987, 1988a) makes use of a sample of coal contracts signed during the 1960's and 1970's. The most recent contract included in that data base was signed in 1979. Data were also available for subsequent ex post transactions prices associated with sales under these contracts for the years 1979, 1980 and 1981, a period preceding the decline in coal markets. In order to examine the behavior of ex post transactions prices pursuant to these "old" contracts during the period of market decline, I updated the information that I had on these contracts by collecting transactions price data for them for the years 1984 and 1985, the most recent years for which such data are now available.[11]

Table 2 provides some useful information on the "old" contracts that are at issue here. There were 120 "old" contracts used to estimate the transactions price equations in my 1988 paper and that had expiration dates in 1984 or later. Of these contracts I was able to find 95 reported in the 1987 Guide To Coal Contracts. Price information was reported for 73 of these contracts. Mine-mouth price information was withheld by the reporting utility for the other 22 of these contracts.[12] I was also able to account for almost all of the 25 contracts that were not reported at all

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[11]This was accomplished by identifying those contracts used to estimate the transactions price equations in my 1988 paper and that had expiration dates in 1984 or later; i.e. those contracts that were not scheduled to expire before 1984. I then proceeded to match these contracts with information provided in the 1987 edition of the Guide To Coal Contracts. The 1987 edition of the Guide provides information reported by utilities for coal contracts in force during the 1984-85 period. If a contract appeared in the Guide I then collected transactions price data (at the mine as before) for 1984 and 1985 as reported there. If a contract was not reported in the 1987 edition of the Guide, I tried to determine why it was missing.

[12]Utilities are now apparently permitted to withhold mine mouth price information if they choose to.

TABLE 2

OLD CONTRACTS WITH ORIGINAL EXPIRATION DATES IN 1984 OR LATER

1. Total Contracts With Expiration Dates of 1984 or Later:	120	
2. Contracts Reported in 1987 Guide to Coal Contracts:	95	
a. price information reported:		73
b. price information withheld:		22
3. Contracts Not Reported in 1987 Guide To Coal Contracts:	25	
a. expired on schedule in 1984, no report filed:		5
b. terminated/consolidated prior to 1984:		13
c. in force in 1983 but not reported in 1987 Guide:		7

in the 1987 Guide. Five of these contracts expired sometime in 1984 and the buyers simply did not report information for contracts that were not in force for the entire reporting period. Another 13 contracts were terminated, consolidated, of significantly revised prior to 1984.[13]

This left only 7 contracts that were in force at the end of 1983 as potential "involuntary termination" candidates during 1984 and 1985. By searching the trade press and SEC filings I tried to track down what happened to these contracts. Three of the contracts were the subject of breach of contract suits. Another contract had been between a utility and its wholly-owned coal subsidiary. When the subsidiary was sold off, a new contract was written.[14] A fifth contract was renegotiated along with several other contracts between a utility and a coal supplier with which it had several contracts. A sixth contract appears to still be in force, but the utility buyer simply did not file a report on any of its coal contracts. The seventh contract appears to have been terminated prematurely, although I was unable to determine the circumstances of the termination.[15]

It is clear that, at the very least, the vast majority of the "old" contracts that were in force when the coal market's decline began in 1983 endured through at least two years of depressed market conditions despite the fact that, as we

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[13]This was determined by checking the 1985 edition of the Guide (covering contracts in force in 1982 and 1983). These 13 contracts either were not reported in the 1985 edition either, and were almost certainly terminated prior to 1983, or the 1985 edition indicated that they had been consolidated with other contracts or a new termination date (1983) negotiated. For example, three of Duke Power's contracts appear to have been renegotiated in the context of the divestiture of its coal mining properties in 1982 and 1983.

[14]This new contract appeared in the 1987 Guide.

[15]I could find no specific information on the seventh contract from these sources. However, the contract involved was the only one that the buyer had reported previously as involving the supply of coal from Montana. By consulting Steam Electric Plant Factors, I was able to determine that the utility burned no Montana coal in 1985. Thus, I assume that the contract was terminated prematurely.

shall see presently, a large gap emerged between transactions prices associated with the "old" contracts and transactions prices negotiated pursuant to "new" contracts in 1984 and 1985. A complete breakdown in contractual relationships does not appear to have occured. Within my sample of "old" contracts there are a few cases of significant price renegotiations, contract termination and litigation. The implications of this evidence will be explored further below.

The 1984 and 1985 transactions price data that were collected for the "old" contracts made it possible for me to examine how transactions prices associated with these contracts changed between 1981 and 1984/85, controlling for the coal attributes---coal quality, supply location, contract execution date---that I previously found best explained transactions prices. I did this is two different ways. First, I re-estimated the hedonic transactions price equations reported in an earlier paper (Joskow, 1988a, Table 6) with the 1984 and 1985 transactions price data and used the estimated price equations to generate predicted values for 1984 and 1985 prices for contracts of different vintages and with coal attributes associated with each of the three supply regions. The estimates of the transactions price equations are similar to those I obtained with the 1979-81 transactions price data (Joskow, 1988a) and are reported in the Appendix (Table A1) to this paper. Second, since most of the explained variation in transactions prices is associated with variations in the regional coal supply area dummy variables, contract vintage variables, and the transaction date, I simply constructed a contingency table of mean transactions prices organized by region, year and contract vintage, grouping pre-1974 contracts and 1974-79 contracts into separate groups (See Table 3 and Table 5). The hedonic price equation estimates yield predicted values for 1984 and 1985 transactions prices for the "old" contracts that are very close to the values obtained by constructing simple contingency tables (Tables 3 and 5). As a result, for simplicity, I will refer to the contingency tables in

the discussion that follows.

Table 3 contains the values for the mean transactions prices for 1981, 1984 and 1985 for the "old" contracts broken down by coal supply region. Information on average BTU content and average sulfur content for each region are also presented. It is clear from Table 3, that the nominal price of coal sold pursuant to these old contracts increased substantially between 1981 and 1985. In the East, the nominal price increase is about 15%. In the Midwest there is about a 10% increase. In the West there is an increase of about 20%. Most of the increase occurred between 1981 and 1984. Transactions prices under the old contracts increased by 1-2% between 1984 and 1985.

The changes in nominal prices observed for the old contracts is consistent with what would be expected if transactions prices followed the BPE adjustment provisions specified in these contracts. As I discussed above, the nominal values of the primary adjustment indices increased over this period. A rough estimate of the magnitude of the expected price change between 1981 and 1984, assuming that the adjustment formulas specified in the contracts determined the transactions prices, would be on the order of 15%, with an 1984-85 increase of no more than 1-2%. The observed changes in actual transactions prices associated with the "old" contracts are certainly in the ballpark of these rough estimates.

The average nominal price for <u>all</u> U.S. coal transactions (all contract plus spot transactions) rose through 1982 and then fell in 1983, 1984 and 1985 (see Figure #1). The average U.S. coal price is about the same in 1985 as it was in 1981.[16] The pattern of prices observed in "the market" as a whole after 1982 is quite different from the pattern observed for the "old" contracts. It is quite clear that transactions

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[16]Actually it is slightly lower in 1985 (114.8 cents/mmbtu in 1985 vs. 117.2 cents/mmbtu in 1981).

prices associated with "old" long term contracts did not turn down with the "average" transaction in the market but continued to rise as adherence to the formal price adjustment provisions would suggest. This implies that there is at least some downward price rigidity associated with these older contracts.

Comparisons of Transactions Price For "Old" and "New" Contracts

The movement in transactions prices pursuant to the "old" contracts is consistent with the continued reliance on the price adjustment mechanisms specified in these contracts. Similarly, a comparison of the changes in transactions prices associated with the "old" contracts and the changes in the average transactions price for all coal sold in the U.S. between 1981 and 1984/85 suggests that there is significant downward price rigidity associated with these contracts. However, there are other possible explanations for the results reported so far. Among other things, the difference between transactions prices for "old" contracts and the average price for coal produced in the U.S. could be explained by differences in the geographical and physical attributes of the coal sold pursuant to my sample of "old" contracts and that for aggregate U.S. transactions, and/or to movements in spot market prices which are not represented in my "old" contract data base at all.[17] Furthermore, comparing the patterns of transactions prices for "old" contracts with the average transactions price for all transactions almost certainly significantly underestimates the magnitude of the price rigidity reported above if the composition of coal associated with my "old" contracts and that for aggregate U.S. coal transactions are similar. Contracts negotiated prior to 1980 represent a significant fraction of total U.S. coal production in 1984 and 1985 and the associated transactions prices are included in the total U.S. average. By simple arithmetic it is therefore likely that if we could observe

[17]prices at the mine for spot market transactions are not publicly available at all.

(xy-contracts.old)

TABLE 3

SAMPLE VALUES OLD (Pre-1980) CONTRACTS

	1981	1984	1985
EAST			
MEAN PRICE (cents/mmbtu)	150.91	174.89	176.92
MEAN BTU CONTENT (BTU/pound)	12,258.00	12,061.00	12,027.10
MEAN SULFUR CONTENT (%)	1.59	1.41	1.44
Observations	81	23	22
MIDWEST			
MEAN PRICE (cents/mmbtu)	122.80	133.44	139.20
MEAN BTU CONTENT (BTU/pound)	11,018.00	11,098.00	11,098.00
MEAN SULFUR CONTENT (%)	3.13	3.14	3.14
Observations	46	28	28
WEST			
MEAN PRICE (cents/mmbtu)	80.41	98.00	99.88
MEAN BTU CONTENT (BTU/pound)	9,508.00	9,639.00	9,593.00
MEAN SULFUR CONTENT (%)	0.79	0.88	0.88
Observations	46	22	20

transactions prices for new contracts negotiated in 1984 and 1985 separately from "old" contracts or the aggregate U.S. averages, we would find an even larger difference between the prices movements observed for "old" contracts and "new" contracts signed in those years than we observe by comparing "old" contract price movements with the changes in aggregate average U.S. transactions prices .

To define more precisely the nature and extent of the downward rigidity of long term contract prices during this period of time, I collected information on new contracts signed by electric utilities in 1984 and 1985. Relying on the 1987 Guide To Coal Contracts, I identified all contracts of at least one year's duration reported by utilities as having been signed in 1984 and 1985 and collected the same information for them that I have for the "old" contracts. The transactions prices observed for these contracts are then compared with comparable transactions prices observed for the "old" contracts in 1984 and 1985.

Table 4 provides information on the characteristics of interest for the contracts signed in 1984 and 1985. Mean prices, BTU content and sulfur content are reported for 1984 and 1985 for each of the three coal regions. I have also estimated transactions price equations such as those estimated in my earlier work using the data for the new contracts. Examples are reported in the Appendix (Tables A-2 and A-3). It is clear that almost all of the explained variation in transactions prices in the "new" contract data set is associated with regional differences in the source of the coal. There is too little intra-regional variation in BTU content and sulfur content in this sample to obtain precise estimates of the effects of both regional and physical characteristics.[18] I will therefore simply rely on the computations reported in Table 4 for comparison purposes.

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[18]The BTU and sulfur variables are simply picking up the difference between the MIDWEST and the other regions.

(xy-contracts.new)

TABLE 4

SAMPLE VALUES NEW (1984-85) CONTRACTS

	1984	1985
EAST		
MEAN PRICE (cents/mmbtu)	135.05	129.97
MEAN BTU CONTENT (BTU/pound)	12,735.30	12,695.10
MEAN SULFUR CONTENT (%)	1.37	1.45
Observations	34	51
MIDWEST		
MEAN PRICE (cents/mmbtu)	114.01	120.13
MEAN BTU CONTENT (BTU/pound)	11,420.00	11,325.10
MEAN SULFUR CONTENT (%)	3.10	3.10
Observations	10	14
WEST		
MEAN PRICE (cents/mmbtu)	71.83	69.05
MEAN BTU CONTENT (BTU/pound)	9,073.60	9,033.6
MEAN SULFUR CONTENT (%)	0.54	0.49
Observations	5	5

Let's first examine the non-price characteristics of the "new" contracts (Table 4) compared to those for the contracts in my "old" contract sample (Table 3) to determine whether simple mean price comparisons are meaningful. In the East, the 1984-85 contracts have only slightly higher quality coal (higher BTU content and lower sulfur content) than the "old" contracts. The same is true in the Midwest. In the West, the 1984-85 contracts have somewhat lower quality coal than the "old" contracts.[19] Overall, however, the coal quality attributes by region are quite similar for the "new" and "old" contract samples. Simple regional price comparisons can therefore be made.

Table 5 summarizes the transactions price information for the "old" and "new" contracts and presents separate mean transactions prices for "old" contracts negotiated before and after the first oil crises.[20] The differences in transactions prices between "old" and "new" contracts are quite substantial. The "old" contracts, negotiated long before the turn in the market beginning in roughly 1983, exhibit much higher prices than "new" contracts negotiated after the market declined. In the East and West, prices paid for coal pursuant to "new" contracts are on the order of 25% to 30% lower than the prices for coal delivered pursuant to the "old" contracts. The difference in the Midwest is smaller--roughly 15%---but as large or larger than the price differences associated with contracts of different vintages estimated in my earlier paper (See Joskow, 1988, Table 7). It is clear that there is very significant downward price rigidity associated with the long term coal contracts negotiated prior

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[19]Using the equations in Joskow, 1988a, Table 6, the estimated difference attributable to the lower BTU content of the Western coal is less than 5 cents per million BTU's.

[20]In previous work I found that there was a significant difference by 1981 between the transactions prices associated with pre-embargo contracts and transactions prices associated with post-embargo contracts. The latter were 10-15% higher than the former in 1981. Joskow, 1988a, Table 7.

(cprice)

TABLE 5

PRICE COMPARISONS OLD VS. NEW CONTRACTS 1984-85 BY REGION AND VINTAGE
(cents per million Btu)

	1984		1985		New Vs. Old Contracts	
	OLD	NEW	OLD	NEW	%diff 1984	%diff 1985
EASTERN REGION						
EAST (all contracts)	174.90	135.10	176.90	130.00	-29.46%	-26.51%
EAST (Pre-1974 Contracts)	164.32		168.64		-21.63%	-29.72%
EAST (1974-78 Contracts)	177.83		179.36		-31.63%	-37.97%
MIDWESTERN REGION						
MIDWEST (all contracts)	133.40	114.00	139.20	120.13	-14.54%	-13.70%
MIDWEST (pre-1974 Contracts)	135.03		138.91		-15.57%	-13.52%
MIDWEST (1974-78 Contracts)	159.32		139.76		-28.45%	-14.05%
WESTERN REGION						
WEST (all contracts)	98.00	71.83	99.90	69.05	-26.70%	-30.88%
WEST (pre-1974 contracts))	74.67		77.01		-3.80%	-10.34%
WEST (1974-78 contracts)	126.00		127.84		-42.99%	-45.99%

to 1980. Not only are the transactions prices in 1984 and 1985 for the "new" contracts substantially lower than the transactions prices observed for the "old" contracts in these years, but they are even lower than the 1981 transactions prices observed for the "old" contracts (Compare the prices in the column for 1981 in Table 3 with the prices for 1984 and 1985 reported in Table 4).

The figures reported in Table 5 also suggest that the price differences are greatest for the post-1973 contracts. These contracts generally had higher initial real base prices, incorporated more extensive price escalation provisions and had tighter reopener provisions than did the pre-embargo contracts (the "old-old" contracts!). This result is quite consistent with the upward price rigidities that I identified in my 1988 paper. Finally, these results also lead to the conclusion that coal price series that mix transactions from contracts negotiated at many different points in time may not provide a very precise indicator of what is happening "on the margin" in the market at a specific point in time. Transactions prices in new contracts had dropped significantly more in 1984 and 1985 than is suggested by the aggregate U.S. coal price series.

Renegotiation, Breach and Litigation

The evidence discussed above suggests that the typical pre-1980 long term contract in force in 1984 and 1985 had "formula" prices far above current market prices. Because these contracts generally specify minimum quantities that the buyer is obligated to take, the buyer's ability to respond to high relative prices by reducing quantities is very limited. Thus, it is fairly clear that a buyer stuck with such a pre-1980 contract who sought to secure coal supplies de novo in 1984 and 1985 would have obtained much more favorable terms than under his existing pre-1980 contract. In the absence of enforceable contractual provisions and relationship specific

investments, a buyer would have simply renegotiated the price in an existing contract to reflect the new market conditions or terminated the contract and negotiated a new contract with an alternative supplier.

It is useful to distinguish between involuntary renegotiation or breach of contract and voluntary renegotiation. Involuntary renegotiation occurs when the buyer (in this case) is able to force the seller to agree to contractual terms and conditions, including termination, that are less favorable to the seller than would be performance on the contractual terms and conditions specified in the contract ex ante. Involuntary renegotiations are likely to be associated with contractual breakdowns (e.g. refusals to take delivery), litigation or threats of litigation, and major changes in contractual relationships. Voluntary renegotiation occurs when changes in the terms and conditions of the contract are mutually beneficial. Voluntary renegotiations are likely to take place without contractual breakdowns and litigation.

If involuntary ex post renegotiations are frequent, long term contracts could be very imperfect mechanisms for guarding against ex post opportunistic behavior or reallocations of risk. This would diminish incentives to make efficient relationship specific investments and to enter into efficient contractual relationships ex ante.[21] Voluntary renegotiations are likely to be desirable, however, if they make it possible for the parties to overcome contractual rigidities that are inefficient in the sense that they reduce the aggregate value of the contracts to the parties.

Whether it is to protect specific investments from ex post hold-ups or opportunism or to provide for an allocation of risks regarding future price uncertainty, buyers and sellers enter into long term contracts with the expectation that the terms and conditions that they agree to ex ante are either self-enforcing

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[21]It is also the case that rigid contractual provisions could restrict efficiency enhancing ex post renegotiations. See Tirole (1988), page 24.

(Williamson, 1983) or can be easily enforced by going to court. If they are not self-enforcing or cannot be easily enforced by the courts some efficient transactions may be deterred and inefficient ex post haggling may occur.

In my previous work (Joskow, 1988a), I argued that the price adjustment provisions contained in long term coal contracts had attractive self-enforcement properties as long as movements in market prices reflected primarily changes in the long run cost of supplying coal. The significant differences between "old" contract prices and current market values after 1983, at the very least, reduced significantly the self-enforcing properties of the "old" long term contracts, by significanrly increasing the seller's incentives to breach. Reliance on court enforcement should have become much more important after 1983.

Long term contracts can be readily enforced by the courts if the terms and conditions of the contracts are clear, the obligations and behavior of the parties in each state of nature are easily verifiable by a court, and the courts can be relied upon to enforce contractual promises through orders for specific performance and/or the assessment of damages reflecting the economic losses to the party that has been damaged (including litigation costs) if a breach of contractual promises occurs.[22] As a general matter, however, we do not expect real long term contracts to be enforceable by the courts with certainty or without potential cost to the damaged party, since such contracts are generally incomplete contingent claims contracts. Contractual provisions may be unclear or ambiguous, obligations and behavior may be difficult to verify, and the litigation process is costly and uncertain. However, because long term coal contracts tend to be very detailed and generally provide very clear provisions for prices, coal quality, and the circumstances under which force majeure applies (Joskow 1985, 1988a), it may not be terribly difficult for a court to

[22]Involuntary renegotiations may also be mitigated by reputational constraints.

determine which party has breached the agreement, especially if the motivation for breach is simply the opportunity the buyer has to obtain coal more cheaply elsewhere. If the buyer does refuse to perform on his contractual obligations he will try to base his refusal on terms and conditions of the contract that are ambiguous or difficult to verify. Such provisions include gross inequity or hardship clauses and force majeure clauses (see Joskow, 1988a, pp. 59-60). For example, we should expect to find buyers who threaten to breach or actually do breach their contracts to make the following types of claims: (a) that changing environmental regulations have made it infeasible to use the coal contracted for; (b) that unanticipated transportation costs or problems make it economically impractical to consume the coal; (c) that regulatory restrictions make it impossible to recover the costs of the coal from ratepayers in electricity rates;[23] or (d) that the high prices are allowing the seller to earn "inequitably" high profits. Complex price adjustment provisions, especially those tied to costs imposed by new government regulations, might also be subject to differing interpretations.

Clearly, the changes in market conditions that occured after 1983 increased the incentives buyers had to breach their contractual agreements. Whatever the underlying "enforceability" characteristics of these contracts are, the probability that involuntary renegotiations will occur should have increased after 1983. The incidence of contractual breakdowns leading to termination and litigation, both obsolutely and relative to earlier periods, and the nature of those contractual breakdowns, provides us with some useful evidence regarding the ease with which contractual promises can be enforced and ex ante commitments protected by contract. If there are a large number of contract terminations and a lot of litigation this would suggest that contractual protections are very imperfect. Alternatively, if it is very

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[23]A utility might even suggest that a state regulatory commission order it to stop taking delivery on a high priced contract in the hope of sustaining a force majeure or gross inequity claim based on an unanticipated order by a government agency.

clear that the buyer's promises are unlikely to be enforceable, we might simply observe a pervasive tendency for prices to be renegotiated to the market levels prevailing in 1983.[24] Pervasive downward renegotiations of contract prices, without associated increases in quantities (see below), would also suggest that contractual promises are difficult to enforce.

There are also many circumstances in which we would expect to observe voluntary renegotiations of long term coal contracts. Some long term contracts have scheduled reopener provisions that allow the parties to renegotiate price and/or quantity provisions at dates specified in the contracts. While the presence of relationship specific investments sunk by both the buyer and the seller in principle could lead to renegotiated prices that are either higher or lower than the prevailing contract price, the characteristics of coal contracts and the circumstances in coal markets after 1983 suggest that we will observe large price reductions resulting from renegotiation in this case. Most importantly, a coal contract would not have provided for a scheduled reopener if hold-ups associated with sunk relationship specific investments were thought to be severe. Furthermore, the large difference in prices between old formula prices and new contract prices is probably quite large compared to the value of remaining relationship specific investments. Thus, we should expect to see buyers taking advantage of reopener provisions and securing large price reductions.

Another case where voluntary renegotiation is likely occurs when the buyer is the highest value user of an incumbent seller's coal and contract prices are above the seller's marginal costs. In such situations the seller may be willing to

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[24]The presence of relationship specific investments makes determining what the outcome of easy ex post renegotiation and bargaining will be, but given the relattively short remaining terms on many of these contracts and the large differences between "formula" prices and market values in 1983, we should at least see numerous instances of downward price renegotiations toward market levels.

negotiate a lower price in return for increased quantities. For example, the quantity or "take" provisions contained in these long term contracts typically specify minimum and maximum quantities that the buyers are obligated to take. The high contract prices may lead buyers to take the minimums required. If the contract price is above the seller's marginal cost of increasing production and the seller's coal is of higher value to the buyer or seller than coal available from alternative suppliers, lower prices and increased quantities could be mutually attractive. In return for a promise by the buyer to increase annual quantities taken, or extending the term of the contract, the seller may be willing to negotiate a lower price.[25] Such renegotiations would clearly be efficiency enhancing.

Opportunities for mutually beneficial renegotiation may also arise when the terms and conditions of the contract restrict the seller's ability to minimize the costs of providing coal to service all of its customers. Coal contracts not only specify the quality attributes of the coal, but also often specify the specific mining properties it must come from. Supplying coal from properties not specified in the contract would provide an excuse for the buyer to terminate the contract on the grounds that the seller had breached his promises. However, a mining company operating multiple mine properties may find it economical to consolidate production to reduce production costs. In such a circumstance the seller would be willing to share some of the savings associated with more efficient production in return for being relieved of restrictive provisions in the contract that would otherwise keep him from doing so. This kind of opportunity is likely to be especially prevalent when the coal market is characterized by considerable excess capacity as it was beginning in 1983.

Finally, there may be circumstances in which a buyer finds alternative

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[25]There is of course no reason to expect that the renegotiated price would fall as far as it would if expected damages from breach were not a consideration.

coal supplies that are priced so much lower than what he is obligated to pay the incumbent seller under the contract that is is economical for the buyer simply to buy out the contract with the incumbent. This will be the case if the alternative supplier's price is both lower than the incumbent supplier's price and the incumbent supplier's incremental costs. There are at least two circumstances in which a mutually satisfactory buy-out would be likely during the post-1983 period. First, the seller may be producing from a relatively high cost mine. The savings to the buyer from contracting with an alternative supplier at a lower market price may exceed the lost profits of the incumbent supplier resulting from termination. Second, if the buyer can find a satisfactory supplier that is located where transportation costs are lower than must be paid to transport the coal supplied by the incumbent, transport cost savings could make it economical for the buyer to buy out the incumbent. Significant changes in coal transportation markets occurred during the 1980s due to deregulation of rail and trucking rates and excess coal transportation capacity, so such opportunities may have emerged.

We have already seen that there is a large gap between "new" and "old" contract prices in 1984 and 1985 and that the behavior of "old" contract prices between 1981 and 1985 is consistent with the continued reliance of the parties on the price escalation provisions contained in these contracts. The evidence is inconsistent with extensive renegotiation of prices in these "old" contracts driven by the lower prices available for new contracts negotiated in 1984 and 1985. We have also seen that the vast majority of the contracts that were still in force at the end of 1983 endured through 1984 and 1985. Outright termination of contracts during this period was infrequent. This suggests that by and large the lack of enforceability of contractual promises was not a pervasive problem during this period.

Given the imperfections in contracts, the uncertainty and costs of

litigation, opportunities for voluntary renegotiation created by price rigidities and responses to them (e.g. at least limited reductions in the quantities of coal taken when quantity flexibility is available pursuant to a contract), and the large gap that emerged between the prices associated with incumbent supply contracts and the prices that could be obtained from new contracts with alternative suppliers in 1984 and 1985, it would be surprising, however, if we did not find at least some evidence of increased efforts by buyers to renegotiate contracts and an increase in contractual disputes leading to litigation. It is clear that contractual breakdowns were not pervasive, but it would be useful to explore the incidence and nature of renegotiation and litigation that did take place and how it varied over time.

In order to obtain further insights into efforts by buyers to renegotiate more favorable prices in existing contracts I collected additional information about contract renegotiations and contractual disputes leading to litigation during the post-1982 period that I have been focusing on. The information came from two primary sources. First, the 1987 Guide To Coal Contracts indicates when and if a contract has been amended or renegotiated. It does not, however, tell us what terms and conditions have been renegotiated or the nature of the renegotiation. A reported renegotiation could reflect major changes in prices and price adjustment provisions or quantities. On the other hand utilities may simply report that a contract has been amended or renegotiated even if only minor adjustments in quantities, delivery schedules or price adjustment provisions have been made. Nevertheless, it is worth determining whether there is any relationship between reported amendments and renegotiations and the 1984 and 1985 transactions prices reported for the "old" contract sample. By comparing transactions prices associated with "old" contracts that did not report amendments or renegotiations with the transactions prices for contracts that did, we can get a feeling for whether the typical reported renegotiation is

associated with lower transactions prices.

Second, I performed a NEXIS search of the leading weekly coal market trade press publication---Coal Week---for the years 1982-1987 to identify all articles referring to contract renegotiations, contractual disputes, and lawsuits associated with these disputes. The aim of this search of the trade press is to obtain information to better understanding the prevalence of renegotiations over prices, how renegotiation behavior changed over time, the prevalence of litigation, and the outcomes of the renegotiations and litigation activity reported.[26] The trade press reports provide an opportunity not only to learn if a contract has been renegotiated or litigated but, more importantly for my purposes, details of the renegotiation and litigation cases reported.

Table 6 provides information on the "old" contracts which the 1987 edition of the Guide To Coal Contracts indicated had been renegotiated in 1984 or 1985. Of the 73 "old" contracts for which I have transactions price information in 1984 or 1985, 27 contracts (37%) indicate that they had been renegotiated. Most of the renegotiated contracts are associated with coal produced in the East (43% of the "old" Eastern contracts) or the Midwest (54% of the "old" Midwestern contracts). Very few renegotiations were reported in 1984 and 1985 for the "old" Western contracts (10% of the old Western Contracts). The inter-regional pattern of renegotiations is consistent with the view that renegotiation is more likely when the value of sunk relationship specific investments is small, as it tends to be for coal supplied from the East and the Midwest (Joskow, 1987). However, I could find no

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[26]This type of "data" can be quite useful, but must be interpreted with some care. There is no reason to believe that trade press reports pick up all cases of contract renegotiations or litigation. Coal Week does appear to include virtually anything contained in a press release sent to them by a utility or a coal supplier. Publicly traded companies have an obligation to disclose developments that may have a significant impact on earnings so, at the very least, the trade press reports should pick up contract renegotiations and litigation involving substantial amounts of money.

TABLE 6

OLD CONTRACTS REPORTING 1984-85 RENEGOTIATIONS
IN GUIDE TO COAL CONTRACTS

1. Old Contracts Reporting 1984/85 Transactions Price Informations:	73	
2. Old Reporting Contracts Indicating 1984-85 Renegotiation:	27	
a. EAST		10 (of 23)
b. MIDWEST		15 (of 28)
c. WEST		2 (of 22)
3. Nature of Renegotiations:		
a. Small Reduction in Contract Quantities:	5	
b. Adjustments of Escalation Formulas in Cost Plus Contracts:	4	
c. Reopener Provisions Specified in Contract:	4	
d. Buyer Takes More Coal:	3	
e. Unknown, but no obvious effects on prices or quantities:	11	

significant differences between the 1984-85 transactions prices associated with contracts indicating that they had been renegotiated and contracts that did not so indicate.[27] I also examined whether the contracts indicating that they had been renegotiated were outliers in the 1981 transactions price equations that I had estimated in my 1988 paper. There was no evidence for this either.[28]

The lack of any significant statistical relationship between transactions prices for "old" contracts in 1984 and 1985 and reported renegotiation activity led me to try to obtain further information about the 27 contracts at issue. I collected more information on price adjustment provisions, actual transactions prices in 1982 and 1983 for these contracts (supplementing the 1981, 1984 and 1985 prices that had already been analyzed), contract and delivered quantities for these contracts, and any other relevant information contained in the 1985 and 1987 Guides and in the trade press. The information that I was able to obtain for the 27 "old" contracts indicating that they had been renegotiated in 1984 or 1985 is also summarized in Table 6.

Five of the 27 "renegotiated" contracts appear to have involved relatively small downward adjustments in contract quantities, but no obvious change in prices. Coal contracts often require a utility to specify the quantities, subject to minimum take provisions, that it will accept over some future period, generally at least a year. Some utilities appear to have reported the nomination of lower quantity takes provided for in the contracts as amendments or renegotiations. These are not the kinds of renegotiations that are of primary interest to us here. Four contracts were

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[27]I re-estimated the 1984 and 1985 transactions price equations for the "old" contract sample reported in Table A1 of the Appendix including a dummy variable indicating whether a contract specified that it had been renegotiated or not. The coefficient was a small positive number that was not significantly different from zero.

[28]I re-estimated the 1981 transactions price equation reported in Joskow, 1988, table 6, with a dummy variable indicating whether or not the buyer reported that the contract was renegotiated in 1984 or 1985. Again, the estimated coefficient was a small positive number that was not significantly different from zero.

originally cost plus contracts. The renegotiations appear to have involved a change from a cost plus formula to a base price plus escalation formula. This appeared to have no significant effects on prices or quantities in 1984 and 1985, however. Four more contracts were renegotiated based on price reopener provisions or broad renegotiation provisions specified in the contracts. In three of these four cases large (20% to 50%) reductions in prices resulted, consistent with prevailing market conditions. The fourth contract in this category is a cost plus contract that has some room for renegotiation based on market conditions. An additional three of the renegotiated contracts involved the buyer agreeing to take additional quantities of coal from the seller. The increased takes involved either an additional contract between the buyer and the seller or the extension of an existing contract. There were significant price reductions associated with two of these renegotiations.[29] For the remaining eleven "renegotiated" contracts I could find no evidence that the renegotiations led to significant changes in prices, quantities or adjustment provisions. However, the renegotiation dates for six of these contracts was in the last half of 1985, so it is likely that the effects of any renegotiations involving prices would not show up until 1986.

To summarize, of the 27 "old" contracts reporting amendments or renegotiations in 1984 or 1985, I was able to identify only seven that appeared to involve significant price renegotiations; four based on reopener provisions of some

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[29]In at least one case, a separate contract for additional supplies had prices that were roughly 50% of those specified in the "old" companion contract. The price reduction in the original contract appears to have been on much smaller. I also found a story in Coal Week referring to this contract. See "Westmoreland Cuts Price, Gains New 10-Year Pact," Coal Week, July 16, 1984, p. 1. "Westmoreland coal has lowered the price on coal delivered under a 15-year contract signed in 1978... at the same time, picked up a 1-million ton/year contract for a 10-year supply... [the utility] might have been feeling pressure from state regulators...One Wall Street analyst says the move by Westmoreland is not surprising, as the incremental volume increases from the new...pact probably would make up for any loss under the price adjustment in the 1978 contract."

type and three associated with increased quantity takes by the buyer. In five of these seven cases, significant price reductions in the "old" contracts appear to have occurred in 1984 or 1985. Thus, price renegotiation appears to have taken place primarily when the contract permits it or when the buyer and seller find it mutually attractive to increase the quantity of coal transacted.

Let me now turn to the results of the search of Coal Week stories about renegotiated contracts. The pattern of major stories about specific contract renegotiations that appeared in Coal Week during the period 1982-87 is consistent with all of the evidence that we have seen so far (see Table 7).[30] There were no stories reported in 1982 and only one in 1983. I found four stories in 1984 and six stories in 1985. In 1986 there were 14 stories and then 8 stories in 1987. Trade press stories about renegotiation activity generally suggest that the pace of price renegotiation and litigation began to gather speed in later 1985 and accelerated in 1986 and 1987.[31] They also make it clear that the primary motivation for the renegotiation activity during this time period was the buyer's perception that contract prices were far above what the buyer could obtain for comparable coal if it contracted with an alternative supplier. About half of the renegotiated contracts discussed in the Coal Week stories involved the buyer agreeing to take additional quantities through an increase in the minimum take, an extension of the term of the contract, negotiation of a new contract to replace an expiring contract, etc., in

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[30]In several cases there were multiple stories about a particular utility and a particular supplier. I only count a contract once in what follows even if there were multiple stories.

[31] "Long Term Contracts Will Return, But They Will Provide New Flexibility, Coal Week, August 12, 1985, p. 7. "Market Watch," Coal Week, August 24, 1987, p. 4.

TABLE 7

COAL WEEK STORIES FOCUSING ON PRICE RENEGOTIONS: 1982-1987

YEAR	NUMBER OF STORIES
1982	0
1983	1
1984	4
1985	6
1986	14
1987	8

NATURE OF PRICE RENEGOTIATIONS

1. Buyer Takes Additional Quantities:	15
2. Quantities Adjusted Down Due To Reduced Power Demand Or Cancelled Plant:	4
3. Contractual Price Reopeners In Ongoing Contracts:	7
4. Buyout of Contract By Buyer:	3
5. Not Specified/or Incomplete:	7

NOTE: There Are more entries under "Nature of Renegotiations" because stories sometimes covered more than one contract involving a specific buyer and a specific seller.

return for lower prices.[32] The second most prevalent source of renegotiation leading to lower prices was the presence formal price reopeners specified in particular contracts. In one story, however, the buyer sought to renegotiate a supply contract based on what it claimed were formal price reopener provisions, while the seller denied that such provisions existed in the contract.[33] There were three cases in which contract renegotiations involved the buyer buying out the contract, two cases in which a renegotiation was associated with a sharp reduction in electricity demand and one case involving a cancelled plant. Two of the stories involving utilities buying out contracts are interesting. In one case, the utility was able to reduce it total costs enough to buy out its contract as a consequence of substantial savings in transportation costs it could achieve by turning to a new supplier.[34] In another case the price of alternative coal supplies was so much less than the contract price that the savings from turning to an alternative supplier more than compensated for the cost of buying out the incumbent contract.[35] Finally, there were a few cases in which the nature of the renegotiation was not specified or the outcome of announced renegotiations was not reported.

Again, it appears that renegotiations tend to take place either because the contract specifically provides for renegotiation or because the buyer has agreed to take additional quantities of coal from the seller. There is little evidence that these

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[32]In one case the contract was for coal to be supplied to a plant that was not yet built. The buyer indicated that absent renegotiation the plant would not be economically feasible. "Renegotiation of Lignite Contract Puts Malakoff Project Back on Track," Coal Week, December 17, 1984, p. 1.

[33] "Colorado Springs Reopens Contract; Solicits Bids On 400,000 T/Y Supply," Coal Week, May 27, 1987, p. 6.

[34]Coal Week, November 24, 1986, p.1

[35]"Wisconsin Regulators Investigating Renegotiated Coal Pact For Utility," Coal Week, February 3, 1986, p. 2. "The cost of the buy-out...will be offset by the lower price of coal under the new contract."

"voluntary" renegotiations reflect threats of litigation and/or the perception of the sellers that the provisions of their contracts cannot be readily enforced.

Finally, let us turn to litigation. Coal Week reported stories on only fifteen sets of lawsuits between utilities and their coal suppliers between 1982 and 1987.[36] Most of the litigation involves coal supplied from the Western region. Except for a couple of lawsuits that appear to have been motivated by legitimate disputes over coal quality, the contractual disputes reported appear to have been motivated primarily by the fact that prices under existing contracts were much higher than the prices prevailing for comparable coal in new contracts. In the contracts at issue, however, there generally is no specific provision to make price adjustments when differences between prevailing market prices and contract prices emerge.

As I discussed above, in order for a buyer to convince a court that it should not liable for damages, it is necessary to find provisions in the contract or ambiguities in these provisions that reduce the expected damages from a breach of contract suit. For example, in several suits utilities appealed to the force majeure provisions in their contracts based on alleged transportation problems, environmental restrictions on burning the coal that was contracted for, and state public utility commission orders not to take the coal that was contracted for because it was too expensive.[37] In several other suits buyers claimed that the seller had calculated the

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[36] In a few cases, trade press stories covered suits by a single buyer and several suppliers. One set of lawsuits between Commonwealth Edison and subsidiaries of Peter Kiewit Son's which began in 1982 eventually involved seven suits and countersuits by 1987. "Commonwealth Edison Must Honor Kiewit Coal Contracts, Court Says," Coal Week, April 22, 1985, p. 1. For the larger cases, there were typically several stories picked up, reporting on the progress of the litigation.

[37] "Decker Sues Commonwealth Edison; Producer, NIPSCO Discuss Contract," Coal Week, November 26, 1984, p. 1; "Commonwealth Edison Must Honor Kiewit Coal Contracts, Court Says," Coal Week, April 22, 1985, p. 1; "Breach of Coal Contract Alleged by Power River Producers," Coal Weeks, August 6, 1984, p.1; "Carbon County Gets Temporary Edge in Contract Dispute With NIPSCO," Coal Weeks., June 3, 1985, p. 7.

price adjustment clauses incorrectly and was overcharging the buyer for coal, breaching their agreement.[38] In several cases the buyers appealed to gross inequity or hardship clauses in their contracts.[39] In one very interesting case a utility claimed that since its contract was a "requirements only contract" it had no minimum take obligations.[40]

Many of the lawsuits reported were settled before going to trial, typically with the buyer paying damages or providing some other consideration to the seller. If the case proceeded to the conclusion of a trial, the buyer typically lost. I found only one instance where a buyer ultimately prevailed. This involved the the unusual requirements contract mentioned above.[41]

The pace of "excessive contract price" motivated litigation does appear to have increased after the coal market turned down. However, unlike what happened in natural gas markets after 1984, there was not a widespread breakdown in contractual relationships leading to an avalanche of lawsuits despite the fact that old contract prices and new contract prices diverged significantly. While the threat of litigation

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[38]"Kentucky Utility Sues Supplier Over 15-year Coal Contract," Coal Week, May 30, 1983, p. 1; "Decker Sues Over Contract For Texas Coal Supply," Coal Week, March 4, 1985, p. 3; "Detroit Edison Sues Decker Coal Owners In Tax Computation Dispute," Coal Week, April 7, 1986, p. 1; "U.S. Fuel Co. Sues Nevada Power in Coal Delivery Contract Dispute," Coal Week, April 21, 1986, p. 1.

[39]#"Platt River, Nerco Talks Continuing," Coal Week, June 9, 1986, p. 6; "Early Triton Injunction Refused; WFA Refutes Short-Payment Charges," Coal Week, April 18, 1988, p. 1; "AMAX Coal Must Negotiate on Coal Price To Dairyland Power, Federal Court Rules," Coal Week, May 26, 1986, p.2.

[40]"NIPSCO Beats Westmoreland Over Colo. Coal Judge Rules Contract Limited Schahfer Plant," Coal Week, August 10, 1987, p. 3. Since the contract price had gotten so high compared to the prices for coal that could be used in the utility's other generating plants, it was uneconomical to run the generating unit for which the coal contracted for was designated despite the fact that it was a new base load unit. The buyer refused deliver on the grounds that his "requirements" were minimal at such a high price, and prevailed in court.

[41] Ibid. It is unusual because it has no minimum take-or-pay provisions (see Joskow, 1985).

may be part of a strategy to renegotiate a contract it does not appear to be a primary route that buyers have relied on to force their suppliers to renegotiate more attractive terms and conditions. I believe that this is the case because the terms and conditions of long term coal contracts are typically fairly explicit and the obligations of the parties quite clear. Since the courts appear to enforce explicit terms and conditions of contracts if forced to interpret them, it is not surprising that litigation has not been an important source of price reductions in old contracts or that the threat of litigation has not motivated more "voluntary" renegotiations. Overall, it appears that buyers and sellers can be confident that if they perform on their contractual promises, contractual provisions will only be altered if it is mutually beneficial for the buyer and the seller to do so.

Conclusions

It is clear that long term contracts negotiated prior to 1980 did not contain provisions that allowed contract prices to naturally adjust to the lower prices available for "new" contracts negotiated after the market turned down in 1984-85. Prices in these "old" long term contracts were rigid downward. The price adjustment provisions that these contracts typically relied upon were not designed to adjust prices in response to demand side shocks. When the market turned down in beginning in 1983, prices in the "old" contracts kept increasing. Transactions prices pursuant to these old contracts were far above those observed in new contracts negotiated in 1984 and 1985. The formal terms of the contracts appear to have been binding on the parties and forced the buyers to continue to take coal at prices higher than they would have obtained if they had been able to negotiate these contracts de novo in the market conditions prevailing in 1984 and 1985. Nor did voluntary negotiation or litigation lead to significantly lower coal prices in 1984 and 1985 for the "old"

contracts. The large differences between old contract prices and new contract prices did lead to a significant increase in contract renegotiation activity by late 1985. In several cases reported in the trade press, buyers were successful in renegotiating lower prices, but these renegotiations tended to be the result of the buyer agreeing to take, in one way or another, additional coal from its supplier or pursuant to reopener provisions provided for in the contract. Few of the buyers with contracts in my "old" contract sample benefited from such renegotiations in 1984 and 1985, however. Although, the pattern of trade press reports regarding renegotiation suggests that the pace may have picked up too late to be reflected in the 1984 and 1985 transactions prices that I have at my disposal, the ability of sellers to sustain their contracts for so long suggests to me that court enforcement of contractual promises is an important constraint leading to the endurance of long term contractual relationships. Thus, while contractual protections are not "perfect," it appears that contracts can be written and enforced to protect relationship specific investments made by buyers and sellers, or risk allocation arrangements agreed to ex ante.

(adjust.app)

APPENDIX

Definition of Variables Used In Transactions Price Equations

Dependent Variable: Transactions price in cents per million BTU

Independent Variables

t1:	Dummy variable equals 1 for contracts signed before 1971
t2:	Dummy variable equals 1 for contracts signed 1971-73
t3:	Dummy variable equals 1 for contracts signed 1974-1977
t4:	Dummy variable equals 1 for contracts signed 1978-79
MIDWEST:	Dummy variable equals 1 for coal supplied from midwestern mines
WEST:	Dummy variable equals 1 for coal supplied from western mines
BTU:	Heat content of coal expressed in BTU per pound
SULF:	Sulfur Content of coal expressed in % of weight
SULF1:	SULF * t1
SULF2:	SULF * t2
SULF3:	SULF * t3
SULF4:	SULF * t4
H:	Heckman correction for sample selection
PRICE79:	Dummy variable equals 1 for 1979 transactions
PRICE80:	Dummy variable equals 1 for 1980 transactions
PRICE81:	Dummy variable equals 1 for 1981 transactions
PRICE84:	Dummy variable equals 1 for 1984 transactions
PRICE85:	Dummy variable equals 1 for 1985 transactions

(Refer to Joskow (1988a), Table 3 and associated discussion)

(augment.reg)

APPENDIX

TABLE-A1

1984-1985 Transactions Price Equations
Pre-1980 Coal Contracts

DEPENDENT VARIABLE: TRANSACTIONS PRICE (cents/mmBtu)

Variables	1984 OLS	1984 OLS/H	1985 OLS	1985 OLS/H	pooled OLS	pooled OLS/H
constant	30.33	27.43	-9.06	-10.21	69.02	67.98
	(54.78)	(55.55)	(58.42)	(59.55)	(17.21)	(16.50)
t1	-81.03	-80.49	-52.04	-52.34	-31.82	-43.62
	(21.33)	(21.70)	(23.49)	(23.61)	(6.65)	(6.49)
t2	-73.80	-74.01	-49.11	-49.74	-32.78	-39.0
	(21.67)	(22.05)	(24.16)	(24.67)	(6.57)	(6.29)
t3	-40.49	-39.51	-14.08	-13.94	-4.76	-8.64
	(18.36)	(18.61)	(20.64)	(20.97)	(5.36)	(6.29)
MIDWEST	-15.91	-11.95	-12.71	-10.77	0.40	3.53
	(10.55)	(11.62)	(10.94)	(12.18)	(3.28)	(3.28)
WEST	-29.86	-25.19	-28.47	-26.22	-40.73	-39.47
	(12.71)	(14.15)	(13.73)	(15.50)	(4.21)	(4.26)
BTU	0.01588	0.01561	0.01773	0.01763	0.00823	0.00878
	(0.0039)	(0.0040)	(0.0041)	(0.0042)	(0.0013)	(0.0012)
SULF1	8.11	7.76	5.78	5.63	0.61	1.87
	(4.75)	(4.82)	(4.96)	(5.06)	(1.61)	(1.54)
SULF2	6.40	6.29	4.42	4.33	-0.38	-2.39
	(6.71)	(6.83)	(7.08)	(7.23)	(2.53)	(2.40)
SULF3	-10.66	-10.64	-13.54	-13.60	-12.13	-12.26
	(6.06)	(6.18)	(6.28)	(6.44)	(1.70)	(1.63)
SULF4	-12.54	-12.21	-2.78	-2.79	-10.84	-12.58
	(7.74)	(7.92)	(8.41)	(8.59)	(2.27)	(2.16)
H	-	38.7	-	16.94	-	-30.13
		(56.55)		(61.38)		(11.43)

(continued on next page)

TABLE A1- Continued

PRICE79	-	-	-	-	-27.08 (2.67)	-24.89 (2.57)
PRICE80	-	-	-	-	-16.49 (2.74)	-14.81 (2.62)
PRICE84	-	-	-	-	15.25 (3.70)	16.50 (3.51)
PRICE85	-	-	-	-	18.93 (3.75)	20.24 (3.57)
R^2 (corrected)	0.656	0.652	0.631	0.623	0.568	0.602
NOBS	73	72	70	69	742	721

(Refer to Joskow (1988a), Table 6 and the associated discussion)

(new.reg)

APPENDIX

TABLE-A2

1984 TRANSACTIONS PRICE EQUATIONS
NEW CONTRACT SAMPLE

DEPENDENT VARIABLE: 1984 Transactions Price (cents/mmbtu)

Variables	(1)	(2)	(3)
constant	134.82 (4.77)	143.49 (69.74)	157.93 (11.34)
MIDWEST	-20.80 (10.12)	14.94 (20.02)	13.38 (18.38)
WEST	-62.99 (13.49)	-72.88 (24.57)	-77.016 (14.50)
BTU	-	0.00114 (0.00542)	-
SULF	-	-16.74 (7.62)	-16.70 (7.54)
R^2(corrected)	0.305	0.346	0.360
NOBS	50	49	49

(new85.reg)

APPENDIX

TABLE-A3

1985 TRANSACTIONS PRICE EQUATIONS
NEW CONTRACT SAMPLE

DEPENDENT VARIABLE: 1985 Transactions Price (cents/mmbtu)

Variables	(1)	(2)	(3)
constant	129.72 (3.15)	199.07 (55.01)	134.52 (4.46)
MIDWEST	- 9.60 (6.85)	-8.93 (10.04)	-4.63 (6.54)
WEST	-60.68 (10.65)	-83.33 (24.57)	-63.93 (7.91)
BTU	-	-0.00492 (0.00416)	-
SULF	-	-4.61 (4.01)	- 3.14 (2.67)
R^2(corrected)	0.306	0.309	0.32
NOBS	71	70	70

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