FOOTNOTES

1. OPEC members: Ecuador, Venezuela, Iran, Iraq, Kuwait, Qatar, Saudi Arabia, United Arab Emirates, Algeria, Libya, Gabon, Nigeria, Indonesia.

2. CPE countries: China, USSR, Albania, Bulgaria, Cuba, Czechoslovakia, East Germany, Hungary, Kampuchea, Laos, Mongolia, North Korea, Poland, Romania, Viet Nam.

3. OECD countries: Austria, Belgium, Denmark, Finland, France, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, West Germany, Australia, New Zealand, Japan, Canada, United States.

4. NOIL countries: All non-CPE countries other than OPEC, OECD, and OIL countries. These countries include some oil producers such as Angola and Brunei.

5. OIL countries: Argentina, Brazil, Colombia, Egypt, India, Malaysia, Oman, Syria.

REFERENCE

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16
Crude Oil Trading and Price Stability

R. Glenn Hubbard, Harvard University
Robert J. Weiner, Harvard University and ICF, Inc.

Petroleum is the world's largest market in value terms--accounting for up to one-third of international trade in recent years--and receives commensurate attention in the economics, business, and policy literature. The discussion here is consequently restricted to petroleum trading--the buying and selling that occurs in an auctioneerless market--and to economic analysis thereof.

Like many mineral industries, petroleum can be divided into vertical stages. Production entails extracting crude oil from existing reserves, development of newly discovered sources, and exploration. Refining is processing the crude oil by heat and chemical means into products that can be readily used. Distribution consists of marketing these products together with service to consumers through gasoline stations, fuel oil deliveries, etc. Each stage involves at least one transaction, which can be a spot or contract trade, or an intracompany transfer.

Before 1970, virtually the entire international petroleum trade was conducted through the channels of the "majors" or "seven sisters"--vertically integrated firms that functioned as a tightly-knit oligopsony in relations with reserve owners, and a tightly-knit oligopoly in selling refined products. Short-term price fluctuation was minimal; a very thin arm's-length market served to balance local excess supply and demand stemming from the vagaries of nature. Prices fell gradually as entry eroded the

majors' position.

The price of oil rose sharply several times in the early 1970s, culminating in the enormous increase of 1973-74 that followed the oil embargo and sharp production cut by several large exporters (notably Saudi Arabia) in the wake of the Yom Kippur War. At the same time, oil-exporting countries began to nationalize their oil concessions, which had been owned by the majors. The state-owned companies, however, had little expertise in petroleum trade, and sold their "participation crude" (nationalization was partial) to the concessionaires, who were obliged to "buy back" the oil they had produced in order to maintain their equity positions. This change in ownership served to redistribute rents, but had little effect on market structure.

After the 1973-74 disruption, the majors and other large refiners sought to "secure supplies" through long-term (typically five-year) contracts with state-owned exporting companies. These contracts were for fixed prices and volumes (sometimes with small quantity tolerances), with the understanding that the contract price (known as the official government selling price, or GSP), would be adjusted periodically, typically at OPEC semiannnual meetings. Like many contracts, agreements to sell crude oil on a long-term basis are lengthy and detailed, devoting considerable attention to matters of product quality, financial, legal, and logistical arrangements, and contingencies. The use of the term "contract" here necessarily abstracts from the bulk of these non-price provisions, except when they have economic implications for trading and market adjustment.

Crude oil trading did not develop until the embargo. Although oil market liquidity ruled out the possibility of any targeted country's being cut off, considerable reshuffling of cargoes took place among the majors, in effect replicating a market allocation of the diminished supply. The experience of single-cargo trading provided the basis for transport divisions of the majors to spin off trading companies in the mid-1970s. The spot market remained thin, accounting for 3-5

percent of total trade according to industry estimates.

A similar supply shock due to the Iranian Revolution of 1978-79 produced another large, rapid price increase. The shock also advanced the dis-integration of the petroleum trade. In 1973, the seven largest companies ("the majors") alone handled roughly three-quarters of the crude oil moving in international trade (excluding the Communist bloc and intra-OECD trade, where the institutions are quite different). By 1978, this figure had fallen to about half, and by 1979 to about 40 percent. Some reduction came from within the majors' distribution systems, but the main structural change was the end of the role of integrated companies as resellers to third parties. Third-party sales were replaced by direct contracts between exporters and a variety of smaller purchasers, primarily independent refiners and traders, but also governments (see Table 1), and by spot-market sales. The industry literature described this change in the marketing and distribution of crude oil as reducing market flexibility, the idea being that the majors played a market-like equilibration role.

When contracts signed in the mid-1970s came up for renewal, buyers were reluctant to enter into further long-term agreements, for several reasons. First, the value of "supply security" was questionable, given the frequency of contract abrogation. Many exporting companies (Aramco in Saudi Arabia being a notable exception) had abrogated their contracts, and sold some of their contracted supplies on the spot market.

Second, the non-price provisions of these contracts had become increasingly onerous. Most contracts included "destination restrictions" that limited the resale of contract purchases, and often prohibited them altogether unless the exporter's permission were obtained. Monitoring these restrictions was costly but feasible; proof of compliance was through a certificate of cargo discharge at the tanker's destination. Industry reports of cheating suggest that the practice was risky and costly, entailing either purchase of forged certificates, or discharging and

immediately reloading the cargo (Parra 1980).

Third, Saudi Arabia, the largest oil exporter, had honored its contracts, and enforced the no-resale provision. The oil-exporting company (Aramco, jointly owned by four of the majors: Exxon, SoCal, Texaco, Mobil), complied, and did not resell the crude oil, instead refining it and selling the products produced on spot product markets. The increased availability of spot supplies served to diminish the value of "security" obtained through term contracts.

The effects of these upheavals in buyer-seller relationships have become manifest in the last 2-3 years. Although contract terms are considered proprietary, it is possible to piece together their general outline from trade literature and conversations with participants. Contracts are typically very short: fixed quantity for one year, fixed price for 30 days. Buyers and sellers don't hesitate to walk away from negotiations. For example, Sonatrach, the Algerian state oil company known for its hard-line commercial attitude, negotiated 15 contracts for the sale of crude oil at official prices in January 1981. By the end of 1982, only one long-term contract remained in force, and crude oil exports had fallen more than 50 percent. Similarly, many of the customers of the Kuwait Petroleum Company and Petromin (Saudi Arabia) suspended or reduced their contractual commitments on grounds that official prices were too high. The Abu Dhabi National Oil Company's 3-5 year contracts expired by 1981, and were replaced by one-year contracts.

Expansion of spot trade has paralled the decline of term contracts. Various industry estimates have placed the fraction of internationally-traded crude oil moving as spot cargoes at 30-40 percent and the remainder of the trade, with the exception of Aramco and some remaining concessions, as traded on contracts adjusted so frequently (through negotiation or through links to spot prices) as to make them effectively indistinguishable from spot trade from the standpoint of market adjustment. A recent industry survey (Petroleum Intelligence Weekly, 24

June 1985) found that of the 23 largest oil-producing countries, all but four linked their contract prices to the spot market.

The distinction between flexible contracts and spot trade must be based on transactions-costs, since the security value of such contracts is close to nil for both buyer and seller. In response to this question, the purchasing manager for a very large U.S. refiner indicated that his contracts served as "base load," with demand variation being handled through the spot market (interview, May 1985). Thus despite the change in contracting regime -- from years to one month or less, the roles played by spot and contract markets remain roughly the same.

Unfortunately, although estimates are plentiful, hard numbers on spot market volumes are scarce. Unlike in the copper market, spot trading of petroleum does not take place on an organized exchange, but rather through a loose network of producing and refining companies, brokers, traders, and transporters linked via telephone and telex. Much of the trading actively was originally centered on Rotterdam, a major oil port and refining center close to the industrial markets of Northwest Europe. "Rotterdam market" is some-times used to refer to the spot market, although today Rotterdam is but an important regional center in the worldwide spot trade. Entry into this market is easy, but not free -- a single cargo of one-half to one-and-a-half million barrels can be worth 10 to 50 million dollars. Potential entrants require a bank letter of credit for at least this much in order to buy and sell.

One U.S.-based major refining company now makes one-quarter of its crude purchases from governments, all through term contracts, and three-quarters from private companies, of which about half is bought spot (interview May 1985). Another, with fewer historical links to producers, buys all of its imported crude on the spot market (interview, March 1985). Table two below provides figures for Japan, whose government has long been concerned with security of energy supply.

While it is difficult to determine how typical the Japanese spot-contract split is of

other importers, the time-pattern is quite striking. The data provide casual support for industry accounts that the spot market grew during the shocks of 1979-1980 (Iranian revolution and Iran-Iraq war), and is larger now than before. Although these statistics are not made public in the United States, a survey of the 31 largest refiners (which account for 90% of imports) produced similar numbers, as shown in Table 3.

Oil-industry reaction to the decline of term contracting is mixed regarding anticipated profit, but clear in terms of market stability -- a Walrasian market is seen as more risky than one in which supply and demand are "guaranteed." One trade-journal article (Roeber 1985) described term contracts as "redolent of stability, continuity, and reliability," and spot trade as "greedy, frantic, and somewhat sweaty." Producers view the vertical regime change as a threat to their market power. A goal of any pricing model should be to examine these assumptions, which are counterintuitive from the standpoint of economics, where the ability of a market to adjust quickly is seen as reducing instability.

The underlying reasons for the rapid and dramatic change in vertical structure--from "almost no spot" to "almost all spot" trade in a decade--are not entirely clear. De Kuijper (1983) showed that the equilibrium fraction of spot trade can be unstable, so that if some players switch away from contracts, a stampede may ensue. Such an explanation is plausible, but does not address when and why such regime changes occur. A less dramatic alternative is that the nature of market shocks has changed, affecting the optimality of contracting. An implication of the model developed below is that contacts will be more prevalent in markets characterized by demand shocks than in markets characterized by supply shocks. Another possibility is that the forced exit of the majors and entry by unintegrated state-owned oil companies, combined with costly reintegration, provides part of the explanation. These hypotheses are not mutually exclusive, nor

easy to disentangle empirically.

The outpouring of books and articles occasioned by the "crisis" has focused on medium- and long-term issues, and somewhat surprisingly, has virtually ignored the crisis aspect--the violent short-term market fluctuations. Economic models of the oil market have stood steadfast on Walrasian grounds, and have performed systematically poorly in capturing short-term responses to exogenous shocks (see Stanford University 1982).

The causes of the market responses to the supply shocks of the 1970s (which were not great in quantity terms) are disputed. Among the purely economic explanations offered are 1) increasing marginal (user) costs due to the failure of new discoveries to match rapidly increasing demand ("running out"), 2) cartelization of the market by OPEC, 3) supply shifts due to replacement of oil companies as decisionmakers by nationals with lower discount rates, and 4) movement from low- to high-price equilibrium along a backward-bending supply curve. These explanations are all theoretically and empirically plausible without being completely satisfying. Nor are they mutually exclusive, although each has its vocal adherents and detractors.

Spot prices substantially exceeded contract prices during both disruptions, and were slightly below them over much of the intervening and succeeding periods. The attached figure shows recent spot and contract prices for the most widely traded crude oil, Mideast Light.

The role played by the two-price system is also a matter of (somewhat less coherent) debate. While descriptive accounts abound, analytical work has been confined to a short piece by Verleger (1982), a critique by Bohi (1983), and a couple of extensions.

The former approach is strictly neoclassical. Since the spot market performs the clearing function, spot prices are treated as marginal in the usual economic sense, with the attendant positive and normative implications. The price adjustment story is that of Fisher, Cootner, and Baily (1972). A negative supply shock causes

excess demand in the spot market. Rising spot prices signal purchasers to accumulate inventories in anticipation of profit based on spot-contract price differentials. This excess demand causes producers to adjust contract prices upward. The two-price system is simply assumed away.

This formulation does nicely in fitting curves; the few empirical oil market models that do not ignore the issue entirely typically treat spot prices as determined by supply and demand, while relegating contract prices to the position of suitably lagged spot prices (Nordhaus 1980; Verleger 1982; Hubbard and Weiner 1983).

The objections to this view are two. First, it is incoherent. A model in which agents are both rational and behave according to the story is hard to imagine. Second, and equally important, it is uninteresting. There is no attempt to explain contracting as part of the market adjustment process. It renders trivial the relationship between spot and contract prices. It fails to consider the volume passing through the spot market, a market that is often quite thin.[2] A few barrels sold at a high price will have little or no impact on contract prices (nor will the world economy, or that of any individual nation, be perceptibly harmed). This neglect of the size of the spot market appears especially strange--considering that according to most tales from the world oil market, spot prices increase when contract purchasers are cut off, and forced onto the spot market.

The alternative advanced by Bohi addresses the first objection. Calling the above theory "fatuous," he argues that the arm's-length market is marginal only in its small size, thinness, and "peculiar function," and is therefore best ignored. He states (1983, p.25) that the spot market is a "peripheral adjunct that is influenced by, instead of responsible for, events in the petroleum market" , but cautions that his proposed alternative (hoarding of refinedproducts by consumers, which shifts the demand curve outwards) is not fully satisfactory theoretically or empirically, concluding that the determinants of world oil prices are not yet fully understood.

Granger-Sims causality tests of the relationships between spot and official prices carried out by Bohi and others (Fitzgerald and Pollio 1984; Lowinger and Ram 1984) show that spot prices help predict future contract prices, but not vice-versa. The interpretation of these tests, however, is problematic. Bohi's tests on refiner's marginal acquisition costs of crude oil, official prices, and petroleum product prices at the consumer level found Granger-Sims causality all around, leading him to conclude that these prices were determined simultaneously. None of these prices helped predict future spot prices, implying that either "the spot price determines all other prices, or more plausibly, the process generating spot prices is substantially different from that generating other prices" (p.25).

Bohi opts for the second interpretation on grounds of incoherence of the theory supporting the first. The other two papers view the tests as upholding the theory. The tests themselves--regressions of reduced-form equations of various current prices on various lagged prices and nothing else--are unable to distinguish between the two views. An important task for this study is to test whether the industry folklore regarding the changing relative sizes of contract and spot markets can be detected in price behavior, using a structural model to predict the effects of such a change.

The current received wisdom and the alternative are deficient in their unidirectional treatment of causality--the spot market affects the contract market (Verleger), or vice-versa (Bohi, de Kuijper)--whereas simutaneous equilibrium would seem natural. A careful examination of the relationship between the two markets is in order. Such is the goal of our ongoing research.

THE HUBBARD - WEINER MODEL

The rest of this paper summarizes our basic model, and illustrates the role of a multiple-price system in adjustment to transitory skocks. We examine the relationship between spot and contract prices, demonstrating its dependence on the manner in which contract prices adjust to these shocks. We find that the persistence of these shocks is a function of structural parameters such as the fraction of trades carried out through contracts, the response of demand to price changes, and the costs of storage.

For simplicity, suppose that contracts are identical, thereby reducing the number of prices to two - the 'contract price' and the 'spot price'. The two-price system works as follows. A fraction α of world trade takes place through long-term contracts between producers and consumers, at price P^C. The remaining portion is traded on the spot market at price P^S.

The market is subject to demand shocks (ε_D) and supply shocks (ε_S), which are assumed to be independently and identically distributed with mean zero and variances σ_D^2 and σ_S^2, respectively. Let $\eta = \varepsilon_D - \varepsilon_S$ represent the net shock to the market. A contract is defined as an agreement to trade a specific quantity. The contract is signed at the beginning of the period, before shocks take place.

We do not allow contracts to be abrogated. Firms that are unable to make or take delivery on contracts must resort to the spot market to fulfill their contractual obligation. Hence, the spot market adjusts to absorb supply and demand shocks. As long as the trading parties are risk-neutral, the contract price will be equal to the expected spot price:

$$(1) \qquad P_t^C = E_{t-1} P_t^S$$

where t indexes periods and E_{t-1} denotes the expectation conditional on information available during period t - 1.

In this paper, we take the parameterization of the two-price system as given. Risk aversion is the motivation usually given for such a scheme. Risk aversion is not necessary, however; others have discussed a model in which

the incentive to offer long-term contracts stems from the real effects of cash-flow variability on a firm's costs. Transactions costs may provide another justification. The resulting tradeoff between spot and contract trade involves, inter alia, the means and variances of the distribution of expected prices and the re lative ease of buyers' adjustment of inventories. These factors underlie the optimal value of α, which is assumed to be optimized and taken parametrically here.

Consider the case in which a negative supply shock (or positive demand shock) initially raises the spot price relative to the contract price. The presence of contracts implies that the spot market price is not the cost of a marginal unit, because a buyer could purchase the good at a lower contract price but would have to commit himself to that price for the duration of the contract. Once α is optimized, the relevant price for purchase decisions is thus

$$(2) \quad P_t = \alpha P_t^C + (1-\alpha) P_t^S.$$

Note that the marginal acquisition cost P_t differs from the average acquisition cost because of prices paid on existing contracts.

Total demand is the sum of consumption and speculative inventory demand. Price-taking speculators, who may also be producers or consumers, trade on the spot market in inventories in anticipation of changes in price, and are assumed to be risk-neutral. Let the objective of speculators over the period (t, t+1) be to

$$(3) \max_{I_t} E_t\left\{(P_{t+1}^S - P_t^S) I_t - \frac{h}{2} I_t^2\right\},$$

where I represents the end-of-period stock level. Holding stocks is assumed to be costly - in fact, increasingly costly - in the size of the stock due to payments to factors fixed in the short run (e.g., storage facilities). Thus changes in price expectations cannot be fully acted upon instantaneously. We follow the literature in modeling such costs as quadratic, the simplest specification of

'diminishing returns'; these costs are indexed by the parameter h.

Maximizing (3) with respect to I_t yields the following demand function for stocks:

$$(4)\quad I_t = h^{-1}(E_t P^s_{t+1} - P^s_t).$$

As with most other studies, the holdings of risk-neutral speculators are a function of the expected increase in price, taking into account the cost of adjusting stock levels. Inventory demand (stock change) is just

$$(5)\quad I_t - I_{t-1} = h^{-1}[(E_t P^s_{t+1} - E_{t-1} P^s_t) - (P^s_t - P^s_{t-1})].$$

Given the assumed contract-price setting behavior, spot and contract prices are equal in equilibrium. An interruption in contract supply ($\varepsilon_{St} < 0$) affects prices as follows. Given planned contract output of αQ, where a caret over a variable denotes its equilibrium value, there is excess demand at the prevailing contract price. The spot market, with output of $(1-\alpha)\hat{Q}$ plus a responsive addition of $Q^s(P^s_t)$, functions to absorb disturbances. That is, the spot price solves

$$(6)\quad (1-\alpha)\, Q^D(P_t) + h^{-1}\,(E_t P^s_{t+1} - E_{t-1}P^s_t) - h^{-1}(P^s_t - P^s_{t-1}) + \varepsilon_{Dt}$$

$$= (1-\alpha)\,\hat{Q} + Q^s(P^s_t) + \varepsilon_{St}.$$

Under the simplifying assumptions of linear responses of supply and demand to price, we have

$$(7)\quad Q^D(P_t) = A - f(\alpha P^c_t + (1-\alpha) P^s_t), \text{ and}$$

$$(8)\quad Q^s(P^s_t) = g P^s_t.$$

Hence equation (6) can be rewritten as

$$(9)\quad (1-\alpha)\,(A - f(\alpha P^c_t + (1-\alpha) P^s_t)) + \varepsilon_{Dt}$$

$$+ h^{-1}[E_t P^s_{t+1} - P^s_t - E_{t-1}P^s_t + P^s_{t-1}] = (1-\alpha)\hat{Q} + g P^s_t + \varepsilon_{St},$$

or

$$(10)\quad [g + f(1-\alpha)^2 + h^{-1}]\, P^s_t = (1-\alpha)\,(A-\hat{Q}) + \varepsilon_{Dt} - \varepsilon_{St}$$

$$-f\alpha(1-\alpha)\, P^c_t + h^{-1}[E_t P^s_{t+1} - E_{t-1}P^s_t + P^s_{t-1}].$$

If we define the long-run average price obtained when expectations are realized:

$$E_t P_{t+1} = E_{t-1} P_t = P_t = P^s_t = P^c_t$$

by $\hat{P}$, then it follows that

$$(11)\quad \hat{P} = (1-\alpha)\,(A-\hat{Q}) \,/\, (g + f(1-\alpha)).$$

Let lower-case variables be defined in deviation form (i.e. $p_t = P_t - \hat{P}$). Using the definition of the contract price, if expectations are rational, we can solve the second-order in-homogeneous difference equation above by standard methods to yield

$$(12)\quad p^s_t = \psi\, p^s_{t-1} + \frac{\eta_t}{g + 2h^{-1} + f(1-\alpha) - h^{-1}\psi},$$

where ψ is the root within the unit circle of the quadratic equation:

$$h^{-1}\psi^2 - (g + 2h^{-1} + f(1-\alpha))\,\psi + h^{-1} = 0.$$

Even transitory shocks exhibit persistence effects on the spot price because of inventory behavior and the existence of contracts. Since $d\psi/d\alpha > 0$, the larger is the fraction of trades carried out under contracts, the greater is the persistence. That is, comparing this result with those of a one-price model ($\alpha=0$), we see that the persistence of transitory shocks is greater in the two-price regime.

EMPIRICAL RESULTS

We estimated equation (12) on monthly spot price data for Mideast Light-34, the most widely-traded crude oil, over the period 1974 - 1984. Because of the high frequency ofthe data, we allowed for first order serial correlation of the shocks. Our objective was to see if we could pick up the decline in the persistence parameter predicted by the model and industry folklore. Our estimated equation was:

$$(12') \quad p_t^s = \psi p_{t-1}^s + \delta + \varepsilon_t + \rho \varepsilon_{t-1}$$

Our OLS estimates are as follows (Standard errors in parentheses):

δ	ψ	ρ	SHIFT	$\bar{R}^2$	
.011 (.177)	.955 (.073)	.317 (.116)	-.463 (.113)	.88	(1)
.057 (.212)	.875 (.075)	.437 (.131)	-.016/month (.008)	.88	(2)
-.053 (.218)	.865 (.077)	.441 (.131)	-.012/month (.006)	.87	(3)

We attempted to pick up the decline in three different ways. Regression (1) allows a one-time shift downward in ψ in 1980. We find a dramatic decline in the persistence parameter, from .95 in the 1970s to .50 thereafter. Regressions (2) and (3) are variations on the theme. In (2) we let ψ decline monthly over the period 1980 - 1981; in (3) over the period 1980 - 1984. The results are similar.

CONCLUSION

In this paper, we have developed a simple, testable model of crude oil trading and price adjustment. Our empirical tests support the hypothesis that the market has become less rigid with the movement toward spot trading.

FOOTNOTES

1 The information in this paragraph comes from Arab Oil and Gas Directory (1984), which contains more details on the contracts.

2 Nordhaus (1980, p. 367) comments: "This argument does not rest on the quantitative importance of the spot market; rather, it treats the spot market as a thermometer for measuring the degree of tightness of world oil markets."

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TABLE 1:

INTERNATIONAL CRUDE OIL TRADE (million barrels per day)

	1973	1978	1979
TOTAL (excluding Communist bloc and intra-OECD)	34	34	34.5
MAJORS	25	16.9	14.5
of which resold	6.7	3.7	1.9
GOVERNMENT to GOVERNMENT	<1.0	3.9	6.0

Source: Jochen Mohnfeld "Structural Changes in World Crude Oil Trade," Intereconomics, Jan/Feb. 1980.

TABLE 2:
JAPANESE CRUDE OIL IMPORTS

Year: Quarter	Imports (mmb/d)	Spot Purchases (%)
1978	4.7	4.1
1979	4.8	7.8
1980	4.4	10.1
1981	4.0	5.6
1982	3.7	9.0
1983	3.6	17.9
1984:1	4.2	20.3
1984:2	3.7	20.2
1984:3	3.5	26.4
1984:4	3.3	25.9
1985:1	3.9	31.3

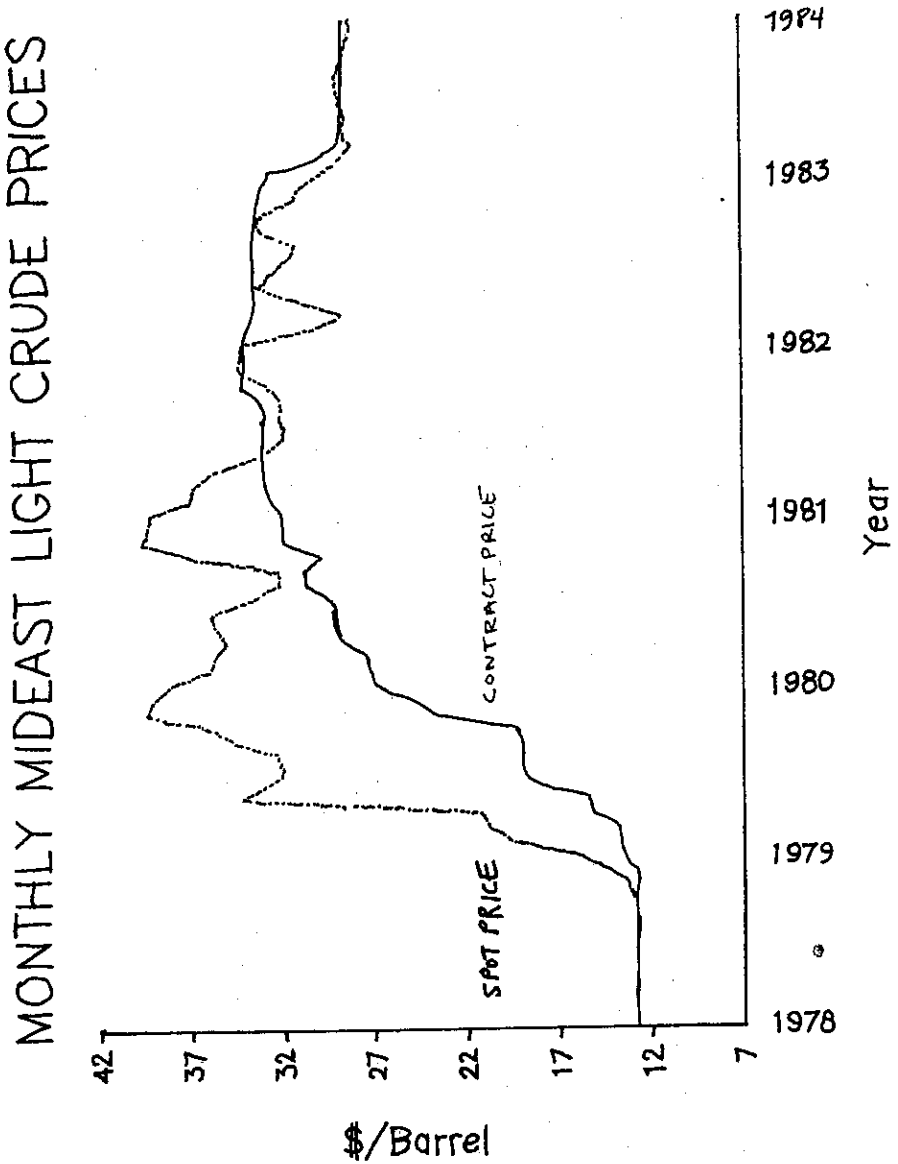
Note: Quarterly figures are medians of monthly data.

Source: MITI, Natural Resources and Energy Agency.

TABLE 3:
U.S. OIL IMPORTS (largest 31 refiners)

Year: Month	Imports (mmb/d)	Spot Purchases (%)
1979:4	5.5	2.6
1979:5	6.1	4.0
1979:6	5.7	12.3
1979:7	5.8	9.8
1979:8	5.7	7.2
1979:9	5.2	9.8
1979:10	5.8	14.0
1979:11	5.6	11.1
1979:12	5.3	11.8
1980:1	4.9	8.8
1980:2	4.8	12.6

Source: U.S.G.A.O. (1980)



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The Evolution of Natural Gas Markets

Richard P. O'Neill, Energy Information Administration

INTRODUCTION

Gas markets in the United States are largely governed by regulations and laws developed over many years. Important historical events that still affect these markets include the conservation laws, Natural Gas Act of 1938, the Phillips decision in 1954, and the Natural Gas Policy Act of 1978. This paper examines this history, the adjustments made by the markets and regulatory bodies to Congressional legislation and Court decisions, and the possible future course of gas markets.

Traditionally, the natural gas markets have been heavily regulated largely due to the natural monopoly characteristics of the physical infrastructure of the market. To produce, move, or consume the first molecule of gas usually involves a great expense with the remaining molecules costing much less. Since natural gas markets are characterized by projects with high