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International Oil--Shortage, Cartel or Emerging Resource Monopoly?

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INTERNATIONAL OIL—SHORTAGE, CARTEL OR EMERGING RESOURCE MONOPOLY?

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The enemy of the conventional wisdom is not ideas but the march of events.
John Kenneth Galbraith

In February 1970, a Cabinet Task Force on Oil Import Control completed a detailed review of the relationship of oil imports to the national security and submitted its final report to the President of the United States.[1] In support of its recommendation that the United States Mandatory Oil Imports Program be phased out in favor of a tariff system for controlling imports, the Task Force relied heavily on a number of underlying conclusions about future growth of international oil demand, sources and security of supply by region, and probable international oil price levels. Since the Task Force was impressed by the cost to the United States consumer of this program—an estimated five billion dollars in 1969—the report analyzed domestic and foreign price relationships in detail. It concluded, "Without import controls the domestic wellhead price would fall from $3.30 per barrel to about $2.00, which would correspond to the world price." The report went on to state, "although we cannot exclude the possibility, we do not predict a substantial price rise in world markets over the coming decade."[2]

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1. CABINET TASK FORCE ON OIL IMPORT CONTROL, THE OIL IMPORT QUESTION (U.S. Gov't Printing Office, Feb. 1970).

2. *Id.* at 124.

On the critical question of national security—the legal basis on which the import program had been justified—the Task Force report concluded that even with a drop in United States domestic crude oil prices consistent with its suggested intermediate tariff level schedule, no more than 900 to 1500 thousand barrels per day of "less secure" Eastern Hemisphere imports would be required by 1980. This was well below the Task Force's threshold level of concern of ten per cent of domestic demand.

From the vantage point of hindsight, three and one-half years later, these underlying judgments about price and adequacy of Western Hemisphere oil supplies have proved woefully inaccurate. For the first seven months of 1973, imports of crude oil and petroleum products from the Eastern Hemisphere (not including Western Hemisphere products refined from Eastern Hemisphere crude) were at the level of 2600 thousand barrels per day or about fifteen per cent of domestic demand and had risen 80 per cent over the comparable period one year earlier.[3] At the time this paper was being written (early December), the Arabs were in the process of effecting an apparently successful oil boycott against the United States for its role in the 1973 Arab-Israeli war. Oil pricing had changed even more dramatically. *Petroleum Intelligence Weekly*, an industry newsletter, stated on October 1, 1973, *before* the start of the 1973 Arab-Israeli war that "with tanker rates hitting Worldscale 360 . . . Arabian light [crude oil] priced at $2.75 f.o.b. is uncompetitive [with Libyan oil at $5.50] in all three locations, since landed prices would be $7.43 in Rotterdam, $7.60 in New York, and $7.81 in Texas . . . ."[4] Three weeks later, after an Organization of Petroleum Exporting Countries (OPEC) price bargaining meeting in Vienna, after the outbreak of hostilities, *P.I.W.* noted, "Neither side is saying it in so many words yet, but the five year 1971 Teheran oil price agreement looked ripped to shreds last week by the decision of OPEC's Gulf member states to

3. These figures were calculated from figures published by the United States Department of Commerce and the United States Bureau of Mines.

4. PETROLEUM INTELLIGENCE WEEKLY, Oct. 1, 1973, at 1. While a substantial part of this high estimate reflected the abnormally high spot tanker rate of the period (six and one-half times the Task Force's base estimate), the Arabian light market price was more than twice what the Task Force expected.

set tax prices unilaterally—Venezuela style. Their abrupt announcement of a staggering 70% jump in postings as of October 16 sent shock waves through the oil consuming countries."[5]

Clearly, the carefully studied economic analysis of the Task Force report gave little forewarning of the turbulence in international oil supply, pricing and tanker rates that was to commence within months of its publication date.[6] But it is grossly unfair to single out the Task Force for its inability to sense an impending change of such magnitude. One has only to read the oil journals of the period to find public statements by spokesmen of the oil companies, the oil-producing governments and consumers that reflect the same general feeling of the late sixties—that world oil was in substantial surplus, that real costs of production (especially in the Middle East) were small and that it was difficult to foresee circumstances that would cause a significant rise in world prices. These views, so widely held, appear to be a manifestation of Galbraith's "conventional wisdom" destined to be violated not by "ideas but [by] the march of events."

The facts that have signalled the demise of the conventional wisdom are well known. International oil prices have moved to significantly higher levels, in large measure because of the growing power of the major oil-producing countries to increase tax levels on their crude oil.[7] However, interpretation of the march of events that has led to this change is hotly disputed among oil economists and analysts.

Is it true, as Professor M. A. Adelman of M.I.T. has argued, that "the world 'energy crisis' or 'energy shortage' is a fiction. But belief in the fiction is a fact. It makes people accept higher oil prices as imposed by nature, when they are really fixed by collusion."?[8] Or is the analysis of James E. Akins, now United States Ambassador

5. PETROLEUM INTELLIGENCE WEEKLY, Oct. 22, 1973, at 1.

6. The first of a series of tax increases in the producing countries was negotiated by Libya in Tripoli in September 1970.

7. For example, the range of tax payments to Saudi Arabia varied between 75¢ and 88¢ per barrel throughout the sixties. By August 1973, before the 1973 war, it stood at nearly $1.80 per barrel, excluding approximately 10¢ per barrel to cover the acquisition of "participation" oil.

8. Adelman, *Is the Oil Shortage Real? Oil Companies as OPEC Tax Collectors*, 9 FOREIGN POLICY 69, 73 (1972-73) [hereinafter cited as Adelman].

to Saudi Arabia, which can be summarized in the title of his recent paper "The Oil Crisis: This Time the Wolf Is Here," nearer the truth?[9]

The debate over what had really happened and what its implications were for the future was active in the early part of 1973. Professor Adelman's views represented a minority opinion among oil analysts, but were accepted by many United States Government officials and by portions of the press. The views more commonly held by most of the oil analysts generally suffered from the poor credibility of the oil industry in public debate.

Adelman argues that the change in oil taxation and pricing cannot be explained by the forces of supply and demand since at the time of his writing, supply had, if anything, been getting easier. Reserves of oil in the Persian Gulf are very large and underproduced by world standards. Real costs of present, or even greatly expanded, Persian Gulf production are in the range of 10 to 20 cents per barrel. As a result, he concluded, the comparatively sizable increases in taxes and prices occurring since 1970 must be attributed to the multinational oil companies who have become the "tax collecting agency" of the producing nations, operating "the greatest monopoly in history and [transferring in 1972] about $15 billion from the consuming countries to their principals."[10] The change in balance of negotiating strength, in his view, came about because the companies were quite willing to accede to a Libyan challenge in 1970 followed by another from the Persian Gulf states, in order to pass the costs along to the consumer and "leave some over" in company profits. And through it all, he believes the United States Department of State, through ineptitude, aided and abetted the producing governments in their efforts to increase taxes.

The converse view, expressed by Akins (as well as by others), is that world oil supplies will have to come increasingly from the Middle East. There are a number of reasons, political as well as economic, why the producing governments may not choose to respond to increasing world demands for oil and thus retain at least the potential to bring about a shortage. Therein lies the question.

9. Akins, *The Oil Crisis: This Time the Wolf is Here*, 51 FOREIGN AFFAIRS 462 (1973) [hereinafter cited as Akins].

10. Adelman, *supra* note 8, at 70.

Are we faced with a world oil shortage, a company-government cartel, or what?

I. The Role of Payments to Governments in International Oil Pricing

The selling price of crude oil from the producing countries can be thought of as having three principal elements of margin. They are (1) accounting costs associated with production, (2) payments to the host government (largely in the form of royalties and taxes) and, (3) the profit margin of the operating company.[11] In 1970, at the time of the Oil Import Task Force report, an approximate breakdown of these margins per barrel representative of the Middle East would have been:[12]

Cost	$0.10
Payments to governments	0.85
Company profits	0.30
Selling price	$1.25

11. This deliberate oversimplification of the elements of international oil pricing masks a multitude of subtleties and complexities. For an excellent history of international oil economics and pricing in the post-War period see M.A. Adelman, The World Petroleum Market (1973). Although I personally disagree with Adelman's interpretation of the events of 1970 to 1973, this does not detract from my respect for this work.

12. This "representative" estimate of Middle East margins is my own, although similar ones are found in sources such as Adelman's writings, as well as in the *Petroleum Intelligence Weekly* and the *Middle East Economic Survey*. The critical estimates are those of realized price and cost—derived from trade press sources—which then permit the calculation of taxes and royalties (in this case using standard OPEC terms). For the mechanics of making the calculations see M.A. Adelman, *supra* note 11, at 219. Note especially that posted prices are used for the tax calculation but have no selling or realized price meaning because of extensive discounting off the posted price, which was prevalent during this period. The practice of posting prices originated in the United States, where refinery purchasers would post the price at which they would buy oil in the field from oil sellers who would deliver to the purchaser's gathering system. In the United States, the posted price is quite commonly the market price. When posting was extended to overseas areas, however, it became a seller's rather than a buyer's price. Over time, it has become subject to greater discounting so that it no longer has much market meaning. It is, however, used for calculating notional profits for tax purposes.

Since costs are the smallest element of the three components of price, it is apparent that analysis of costs by itself sheds little light on Middle East oil pricing behavior. It is primarily in the stability (or lack thereof) of government tax takes and company profit margins that the explanation of pricing trends must be found. Jahangir Amuzegar, the Chief of the Iranian Economic Mission to the United States, summarizes this relationship succinctly in his recent *Foreign Affairs* paper.

> By a bounty of nature, the fossil fuel floating underneath the Middle East and North African sands and offshore waters is of such quality and ease of reach as to make extraction costs at the wellhead only a fraction of such costs in other parts of the world. . . . Since oil of the same quality is bound to obtain uniform f.o.b. [sic] prices in the world free markets, Middle East and North African crudes have up to now offered their owners an enormous windfall profit—what economists call Ricardian rent—stemming from the difference in production costs compared with Mexican Gulf suppliers and other high-cost producers.
>
> The post-war history of the oil industry is a story of a continued jockeying among petroleum exporters and the oil majors, to divide (and appropriate) this rent.[13]

Although it has become common in recent years to speak of tax paid cost (*i.e.*, 10 cents + 85 cents, or 95 cents per barrel in the Middle East in 1970) as if the total were a firm cost to the producing (and selling) company, Amuzegar rightly points out that the tax component is a part of the overall economic rent, as well. Therefore, the recent ability of the host governments to prevent tax discounting has been an important factor in the relative pre-1970 stability of international prices.

As for the companies' ability to maintain their relative profit margins, it is important to recognize that the average Middle East margin breakdowns apply principally to the historic long-lasting concessions in Saudi Arabia, Iran, Kuwait and Iraq predominantly held by the major integrated international oil companies.[14] New

13. Amuzegar, *The Oil Story: Facts, Fiction and Fair Play*, 51 FOREIGN AFFAIRS 676, 678 (1973).

14. These are the companies which Enrico Mattei, the post-War head of the Italian government oil company, E.N.I., dubbed the Seven Sisters. They are British Petroleum, Exxon, Gulf, Mobil, Shell, Standard Oil of California, and Texaco.

entrants have rarely been able to achieve such successful discoveries and low costs in the newer areas available for exploration, have usually faced stiffer concession terms from governments for their blocks and have usually been unable to move large quantities of their discoveries without price discounting. Thus, for most, though not all, of the newcomers, the "average" Middle East profitability has been illusory. The most prominent of the few successful ventures for a time originated in North Africa. The conditions that permitted those successes have now been essentially eliminated.

For their part, the majors have been able to maintain their profit margins by transferring oil through integrated channels. These have required heavy downstream investment in transportation, refining and marketing, largely for Europe and Japan. As a result, producing profit margins alone are misleading; integrated return on investment is a better measure of companies' ability to preserve their profits from their historic Middle East concessions.

Since the largest part of the margin is represented by payments to governments, some historic perspectives about government-company tax relationships are essential to an understanding of what happened in 1970.

At the risk of oversimplification, I believe that it is possible to classify the post-World War II history of relationships between the producing governments and the companies into four broad time periods, each time period being marked by a set of events that signalled the end of one era and the start of a new relationship. In the early post-World War II years, major oil company concessions in the principal producing countries usually called for a fixed royalty per barrel or, if there was a profit-sharing component, a small portion of the profit accrued to the government and a large share went to the company account. Since most oil moved through integrated channels and arms-length transactions were less common, the profit margins on production were not as visible as they are today. However, it is clear that government tax takes were small compared to company margins and, because of the low profit sharing level, were not particularly sensitive to company pricing policies. This pattern began to break up in the late forties and early fifties when the governments began insisting on a better share of the profits than was provided for in the early concession agreements. In 1948, Venezuela achieved a 50/50 split of the profits. Arabian American Oil Company (Aramco) extended 50/50 terms to Saudi Arabia in December 1950. Then in April 1951, with the

election of Mohammed Mossadegh as Premier of Iran, negotiations between Iran and its concessionaire, Anglo Iranian Oil Company (now British Petroleum) broke down, and Iran nationalized the British interest in Iranian oil. A government company, National Iranian Oil Company (NIOC) was set up to take over the Anglo Iranian properties. However, a unified stand by the oil companies against the nationalization made it all but impossible for NIOC to move any of its oil in world markets. The Iranian nationalization dispute, which was not formally ended until the formation of the Iranian Consortium of international oil companies in August 1954, marked the end of the first period of post-War government-company relationships.

The Iranian experience is even more significant for the influence that it had on oil industry thinking for nearly twenty years. As a result of Iran's unilateral action, its oil production was virtually shut down for over two years, and the nation lost heavily during the period. That lesson of the risks of unilateral action was burned into the consciousness of oil men and government ministers alike and has had a profound influence on government-company negotiating relationships almost to this day.

The second period of nominal 50/50 profit splitting endured until 1960. In the early part of this period, oil generally moved at posted prices (on which the profit margin was calculated for tax purposes) and these prices rose along with rising crude oil prices in the United States. As a result government per barrel take rose as well. At the time of the 1957 Suez crisis a crude oil price increase in the United States prompted increased Middle East posting, but subsequent oversupply led to substantial discounting from posted prices. By 1959, the imposition of the Mandatory Oil Program in the United States removed the last logical excuse for tying international oil prices to the United States market. As international discounting levels deepened, the companies sought to reduce their tax payments per barrel by reducing posted prices in 1959 and again in 1960. The producing countries reacted to this last reduction in their per barrel tax takes by banding together to form the Organization of Petroleum Exporting Countries,[15] whose initial

15. The membership has grown from seven original member states to include Abu Dhabi, Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, and Venezuela. Ecuador, an associate member at the time of this writing, subsequently has been accorded full membership status.

charter aimed to "restore crude oil prices to the level which prevailed prior to August 9, 1960 . . . ."[16] This event marked the end of the second period.

The net effect on government revenues of the two reductions in posted prices ranged from 6 cents to 13 cents per barrel, depending on the country. Although OPEC was unable to restore posted prices as such, through long and difficult negotiations it managed to restore most of the 1959 and 1960 reductions in per barrel takes by 1970. This was accomplished first in 1962-63 by "royalty expensing," which had the net effect of increasing the tax rate, and subsequently by the elimination of prearranged allowances off posted prices. Since realized prices declined still further below the postings, which continued to be used for tax calculations, the 1970 split was closer to 75/25 than to the nominal 50/50.

The first post-War period was marked by low government takes and by comparative insensitivity to market price fluctuations. In the third period OPEC succeeded in restoring stable per barrel takes at much higher levels, after a second period in which the introduction of the profit-sharing principle increased government tax take levels while potentially exposing them to market forces. Thus we come to the events of 1970-71. They marked the beginning of the present period in government-company relations in which the governments—not the companies—appear to have the dominant power to set taxes and to influence prices.

Just how strong that power is can be shown by the moves that have occurred in international oil taxation since September 1970. At that time Libya was able to extract from several independent American oil companies an increase both in Libya's tax rate and in the posted price for Libyan exports. Within a month the majors had matched the independents' agreement in Libya and the tax increases had spread to Persian Gulf crudes delivered by pipeline to the eastern Mediterranean. In December, Venezuela legislated an increase in tax rate and took unto itself the right to set tax reference prices unilaterally. In early 1971, the Persian Gulf states embarked on negotiations with the oil companies that culminated in the February 1971 signing of a broad five-year tax settlement known as the Teheran Agreement,[17] which not only increased tax rates and posted prices but also provided for a scheduled further

16. OPEC Res. IV, IV Conference, Geneva, April 5-8, 1962.
17. *See* MIDDLE EAST ECONOMIC SURVEY, Feb. 19, 1971.

escalation of tax takes later in 1971 and in 1973, 1974 and 1975. In April 1971, a new round in Libya raised that country's taxes still further and a Nigerian settlement patterned after that in Libya was signed shortly thereafter.

The first United States dollar devaluation led to a Geneva agreement[18] in January 1972 that provided further changes designed to tie tax payments to currency fluctuations. This was renegotiated in June 1973 to reflect the second dollar devaluation when the first agreement was deemed insufficiently appropriate to OPEC's objectives. Meanwhile several Gulf states had negotiated a General Agreement on Participation in December 1972 that provided for the gradual acquisition by the countries of "participation" interests in their concessionaire companies starting at 25 per cent immediately and reaching 51 per cent by 1982. This had the effect of increasing cash payments to the governments by about ten per cent per barrel even though it was not in the form of traditional taxes and royalties. The culminating move up to November 1973 was the aforementioned increase in postings by 70 per cent in October 1973. Clearly, the amount of change in international oil pricing since mid-1970 is far greater than in the entire previous post-War history of government-company relationships. One can rightfully ask what limits, if any, exist on the tax levels—and prices—that the producing states can command.

Adelman explains the dramatic changes by first noting, "Some powerful force has overridden demand and supply."[19] But then he ascribes the evolution of this change first to a willingness of the companies to agree to a Summer 1970 Libyan demand for a tax increase since a tanker shortage had already driven up product prices and profit margins in Europe. The real turning point in his view, however, was a January 20, 1971, meeting of the Organization for Economic Cooperation and Development (OECD) in Paris at which the United States State Department and the oil companies persuaded the OECD not to resist the price increases. When the meeting announced the results of the discussion, it was—in Adelman's view—an advance capitulation. He then goes on to state, "Before January 20, an open threat by the OPEC nations would not have been credible, in view of the previous failure of even mild attempts at production regulation in 1965 and 1966. But

18. *See* MIDDLE EAST ECONOMIC SURVEY, Jan. 21, 1972.
19. ADELMAN, *supra* note 8, at 72.

after the capitulation, threats were credible and were made often."[20] Thus Adelman's explanation lies more in the area of a change in the psychological balance of power than it does in anything fundamental underlying the bargaining relationship. In his words, "The Genie is out of the bottle."[21]

In my view, Adelman has missed the most important point of all—that the most significant event of 1970 was the successful challenge by Libya of one of the most basic tenets of the conventional international oil wisdom of the past twenty years. Adelman himself states that tenet in no uncertain terms as if it were as true in 1972 as it was in 1969. "Oil supply is threatened by one and only one danger: a concerted shutdown by the OPEC nations. No single nation can do any harm."[22]

The logic of a world oil surplus so great that no one nation could influence overall supply and demand—and therefore price—was born of the 1951 Iranian nationalization. At the time, there was very little appreciation of the magnitude of the oil deposits in the Middle East. The world's principal experience in oil exploration and production up to that date had been gained in North America and in Venezuela. That experience had given little reason to anticipate the sheer magnitude of the occurrence of oil in the Middle East.[23] At the time of the Iranian nationalization, Iran was the second largest producer in the Eastern Hemisphere, only slightly behind the Soviet Union. Its production represented 40 per cent of the total Middle East and 25 per cent of the production of the entire Eastern Hemisphere. The nationalization of Anglo Iranian, and the subsequent unified stand against Iran taken by the international oil industry, led to an effective embargo of Iranian oil in world markets. There resulted a virtual shutdown of Iranian production for more than two years. However, the discoveries of the very sizable oil fields of Saudi Arabia, Kuwait and Iraq, which had been made earlier, enabled the international oil companies to expand production from alternative sources very quickly.

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20. *Id.* at 81.
21. *Id.* at 85.
22. *Id.* at 101.
23. In 1950, for example, the Western Hemisphere produced 72% of the world's oil from 33% of its reserves. In 1972 the Western Hemisphere produced 31% of the oil from only 12% of the world's reserves. Historic production figures by country are from the *American Petroleum Institute Facts and Figures*; current production figures are published monthly in the *Oil and Gas Journal.*

Table 1 shows the extent of the shift from Iran to its neighbors. The Middle East, as a whole, was able to sustain a nearly nine per cent annual *increase* in production over the two years despite the virtual shutdown of the area's largest oil producer. Thus was born the fundamental theory of the fifties and sixties—that no country in a world of oil surpluses could act unilaterally to control supply and, by implication, price since other producers would move in swiftly to replace the lost production.

TABLE 1
PRODUCTION IN 1950 AND 1952[24]
(Thousands of barrels per day)

	1950	1952	Change
Iran	664	21	(643)
Kuwait	344	749	405
Saudi Arabia	547	827	280
Iraq	136	387	251
Other Middle East	65	100	35
Total Middle East	1756	2084	328

The theory that no one country could manipulate supply and demand was tested and found wanting in the summer of 1970 by Colonel Qaddafi and the Libyan Government, admittedly using as a lever tanker capacity limitations rather than producing capacity limitations. Sporadic tax negotiations had been going on since January of that year between the oil companies and the Libyan Government but little had come of it until the following May when the Syrians cut the TransArabian pipeline from Saudi Arabia to the eastern Mediterranean, thereby disrupting delivery to Europe of 500 thousand barrels per day of short-haul tanker crude. Within a month, Libya began selective cutbacks on crude production for some companies in the name of conservation. First and hardest hit was Occidental Petroleum with a reduction of about 300 thousand barrels per day or nearly 40 per cent of its output. The Oasis group, principally independents, took the next largest cut. When it was over, the availability of oil at Mediterranean outlets had been reduced by about one-sixth and had to be made up by long-haul tanker shipments around South Africa. Tanker rates soared. Although Adelman dismisses the overall Mediterranean "cutback

24. *See* note 23 *supra*.

and closure [as] small,"[25] about 40 per cent of the cutback was suffered by independents who had neither offsetting Persian Gulf production of their own to substitute on their sales contracts nor control of tanker bottoms to get Persian Gulf oil to Europe. It is not surprising that the first precedent-setting tax concessions were made to Libya in September by Occidental and then by the non-major members of the Oasis group. The majors followed suit within a month.

By the time of the January 1971 OECD meeting in Paris, the Libyan precedent had been set, Venezuela had legislated unilateral tax-setting authority and scattered tax increases had already been granted to Iraq, Saudi Arabia, Iran and Kuwait. The pattern bore a striking resemblance to the divide-and-conquer labor union bargaining of the 1950's in the United States between the United Auto Workers Union and the major American automakers. First, the weakest company was selected as the target for a strike; secondly, favorable contract terms were negotiated; and thirdly, the contract was used as a precedent with the remainder of the industry. The tanker shortage that resulted from the loss of the million barrels per day of Mediterranean oil, coupled with specific pressure on the undiversified American independent companies in Libya, was enough to cause a precedent-establishing settlement. Much of the precedent was a *fait accompli* by the time of the Paris meetings. The existence of ample reserves in the Middle East had no effect on the shortage because of the difficulty of transporting Persian Gulf oil to market. Rather the incident demonstrated that when any part of the complex oil production, refining and transportation system breaks down, there can be disruptive shortages; and that when the shortages concentrate on a group without an alternative, they can well lead to precedent-setting concessions.

Had the major companies banded together before the 1970 Libyan negotiations (with Justice Department antitrust sanction) to share supplies with the independents, the loss of the Mediterranean oil might not have been significant. But they did not. Similarly, had it been a Persian Gulf country instead of Libya that attempted a comparable cutback, the loss would have been quickly replaced elsewhere in the Persian Gulf. In that case as well, the conventional wisdom would not have been violated, since the

25. ADELMAN, *supra* note 8, at 77.

tanker shortage was an essential part of the supply breakdown.

The Libyan success in unilaterally precipitating oil shortage by utilizing tankers raises the inevitable question of how much cutback in the Persian Gulf, itself, is needed to bring about a comparable disruptive shortage. Here it is essential to focus on producing capacity (the rate at which the oil can be gotten out of the ground) as distinct from reserves, since shortages occur if no country is able to or prepared to increase its production to replace the deficit in a reasonable length of time. While a country with large reserves in excess of its current production requirements may create added producing capacity through further oil field development, it still will require a finite time, during which the consuming world will be operating on its inventories, contingency stocks and orderly demand cutback programs if it is to avoid overall shortage. And if there has been no orderly sharing arrangement among consumers worked out in advance the shortage may selectively fall on countries or groups ill-equipped to absorb it. A few figures will illustrate how much more vulnerable the world is to this type of Middle East cutback in 1973 than it was in 1951, and how much less again the world is likely to be able to resist it in 1980.

II. The Dynamics of World Oil Growth as a Background to the Changed Power Relationships

In 1950, the world was producing ten million barrels of oil per day. By 1970, world oil production had increased almost fivefold to a level of nearly 48 million barrels of oil per day.[26] During this twenty-year period of nearly eight per cent annual growth, the role of various countries in creating a demand for OPEC oil has shifted substantially. The ability of the various producing countries to respond to growing world demands also has changed markedly. Throughout the period, the United States has continued to be the world's largest oil consumer as well as the world's largest oil producer; however, its ability to sustain its own growing consumption has significantly deteriorated. In contrast, Japan, the world's third largest oil consumer (the Soviet Union ranks second and is largely self-sufficient) is almost totally dependent on imported oil. In

26. By July 1973, before the Arab-Israeli war, world oil production had reached a level of 57 million barrels per day. Current production figures are from monthly reports in *Oil and Gas Journal* issues.

order to understand the changes that have taken place in the bargaining power of the countries, it is valuable to examine the changing roles of individual consuming groups and producers in the world picture during the period since 1950.

Figures 1 through 5 are designed to convey in graphic form these shifting patterns of consumption, indigenous production and resulting net demand on OPEC supply for the groups of consuming countries of the world outside OPEC.[27] The steady exponential growth rate of world oil consumption has meant that the necessary annual increase in total world oil production has been growing in absolute terms, as well. While the world, on balance, needed an average annual increase of 820 thousand barrels per day to sustain growing consumption in the period of 1950 to 1954, that average annual required increase had reached approximately 3300 thousand barrels per day in the 1970 to 1972 period. My estimates of the 1973 to 1975 period suggest that we could have expected a normal 4000 thousand barrels per day annual increase had not the war and the embargo intervened.[28]

Figures 1 through 5 are best read by observing the changing pattern for a given area over time.[29] Thus Japan started out as a small factor in annual growth in consumption, but its high-growth economy has made it an increasingly important factor in new required world oil supply. Since it has essentially no indigenous oil

27. The graphs are in incremental, rather than absolute, form. Thus, for example, the consumption bar on each figure represents the average annual *increase* in consumption in barrels per day for the period rather than the absolute *total* consumption. Average annual changes in production may be negative, representing a decline in producing rate. Average annual changes in net export/import balances are most commonly negative and thus represent a net additional import requirement from OPEC. Actual data for figures 1 to 4 are provided for the time span from 1950 to 1972. I have included a best normal estimate (made before the disruptions of the 1973 Arab-Israeli war) for the period of 1973 to 1975. These figures have been pieced together from emerging trends and from various announced plans, forecasts, and estimates as published in National Petroleum Council studies, Shell Oil publications, *Petroleum Intelligence Weekly, Platt's Oilgram*, and *Oil and Gas Journal*. The short-term forecast was designed to depict the immediate pre-war supply/demand environment.

28. World oil production rose an average of nearly 4600 thousand barrels per day for the 12 months ending June 1973 from the period a year earlier.

29. The time periods selected are not uniform. Rather they represent periods of similar supply patterns from OPEC and thus are properly tied into figure 6 on production.

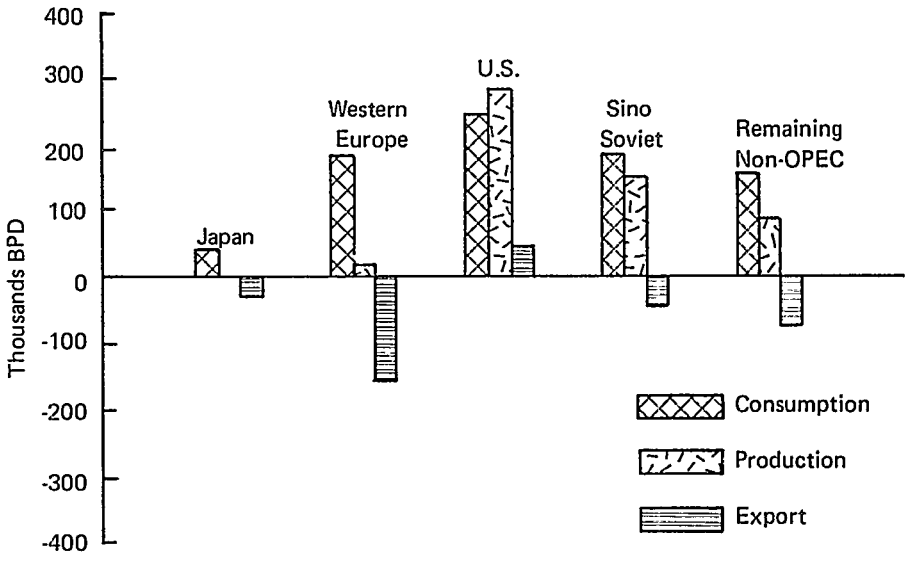

FIGURE 1 AVERAGE ANNUAL CHANGE IN CONSUMPTION/PRODUCTION/EXPORTS
WORLD, EXCLUDING OPEC
(THOUSANDS OF BARRELS PER DAY, 1950-54)

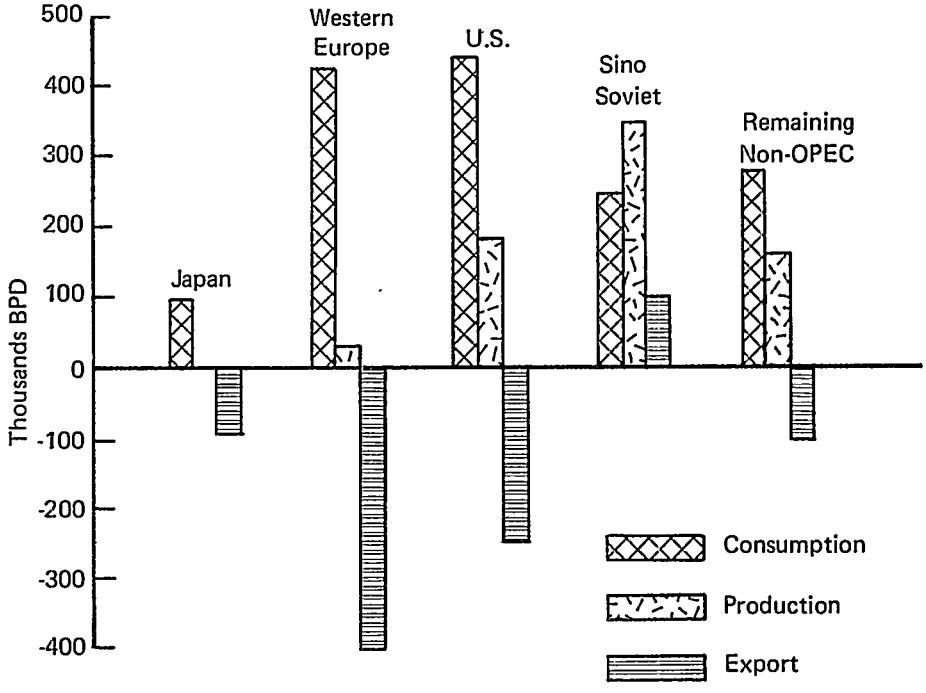

FIGURE 2 AVERAGE ANNUAL CHANGE IN CONSUMPTION/PRODUCTION/EXPORTS
WORLD, EXCLUDING OPEC
(THOUSANDS OF BARRELS PER DAY, 1955-62)

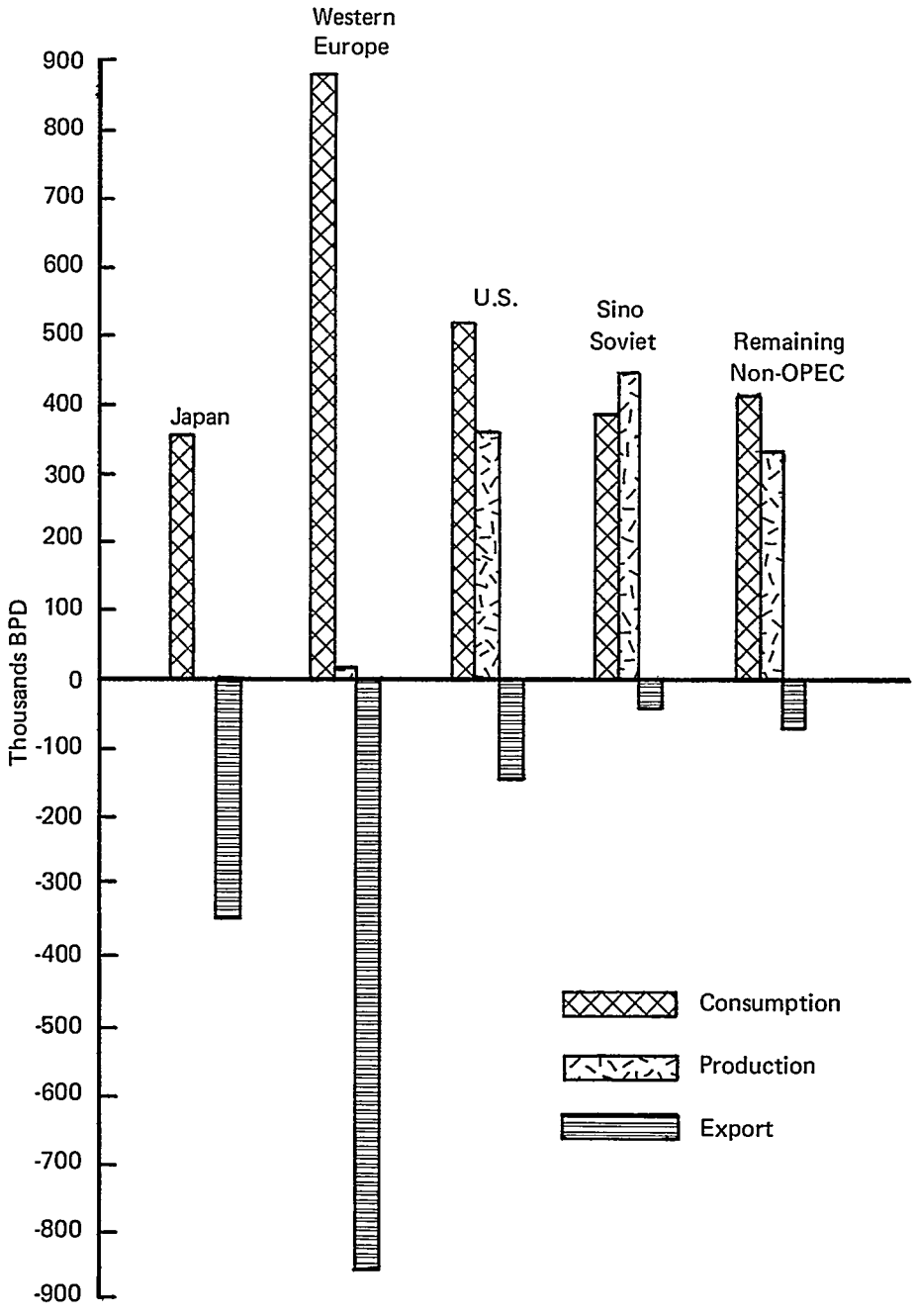

FIGURE 3 AVERAGE ANNUAL CHANGE IN CONSUMPTION/PRODUCTION/EXPORTS WORLD, EXCLUDING OPEC

(THOUSANDS OF BARRELS PER DAY, 1963-69)

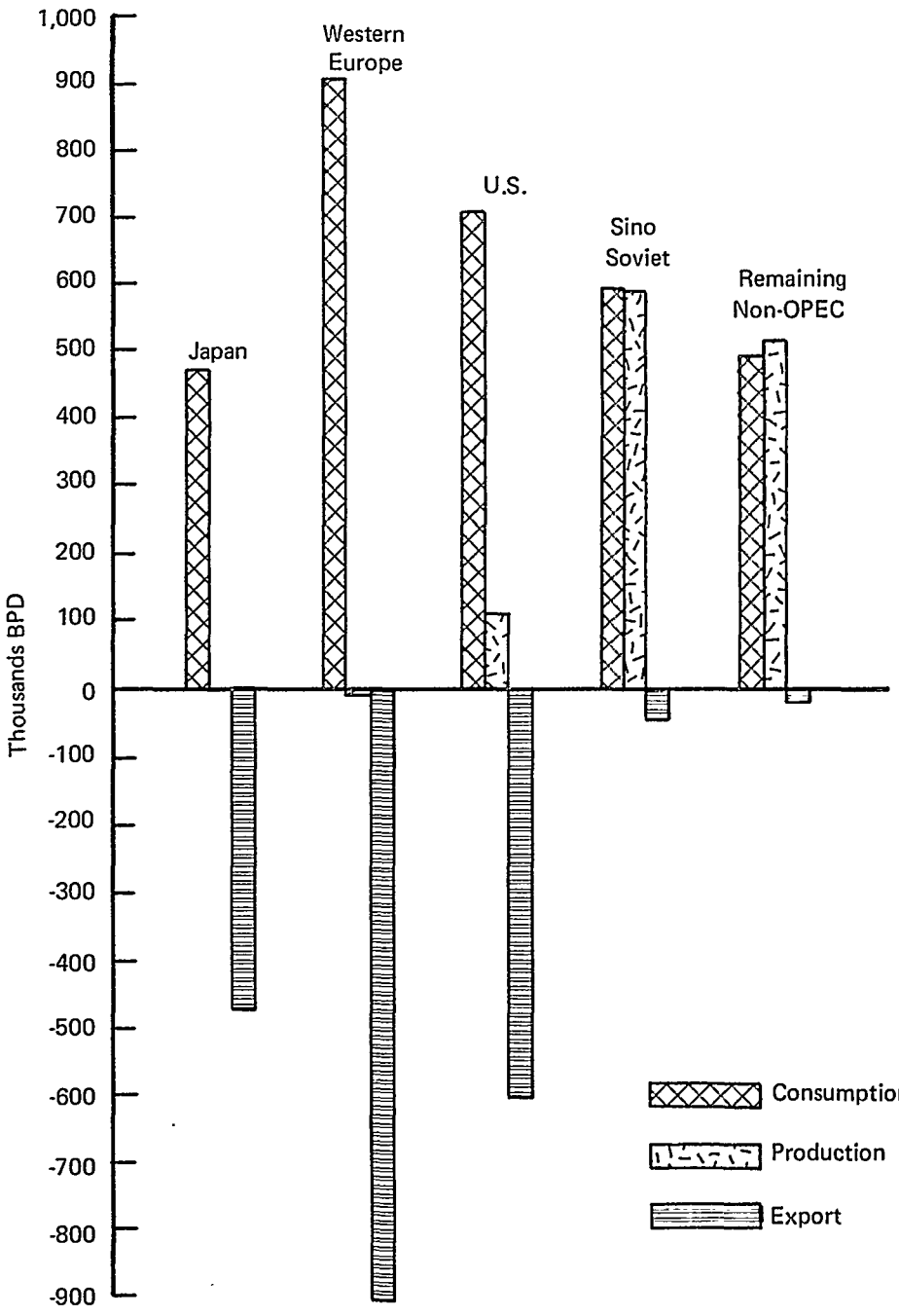

FIGURE 4 AVERAGE ANNUAL CHANGE IN CONSUMPTION/PRODUCTION/EXPORTS WORLD, EXCLUDING OPEC

(THOUSANDS OF BARRELS PER DAY, 1970-72)

Spring, 1974

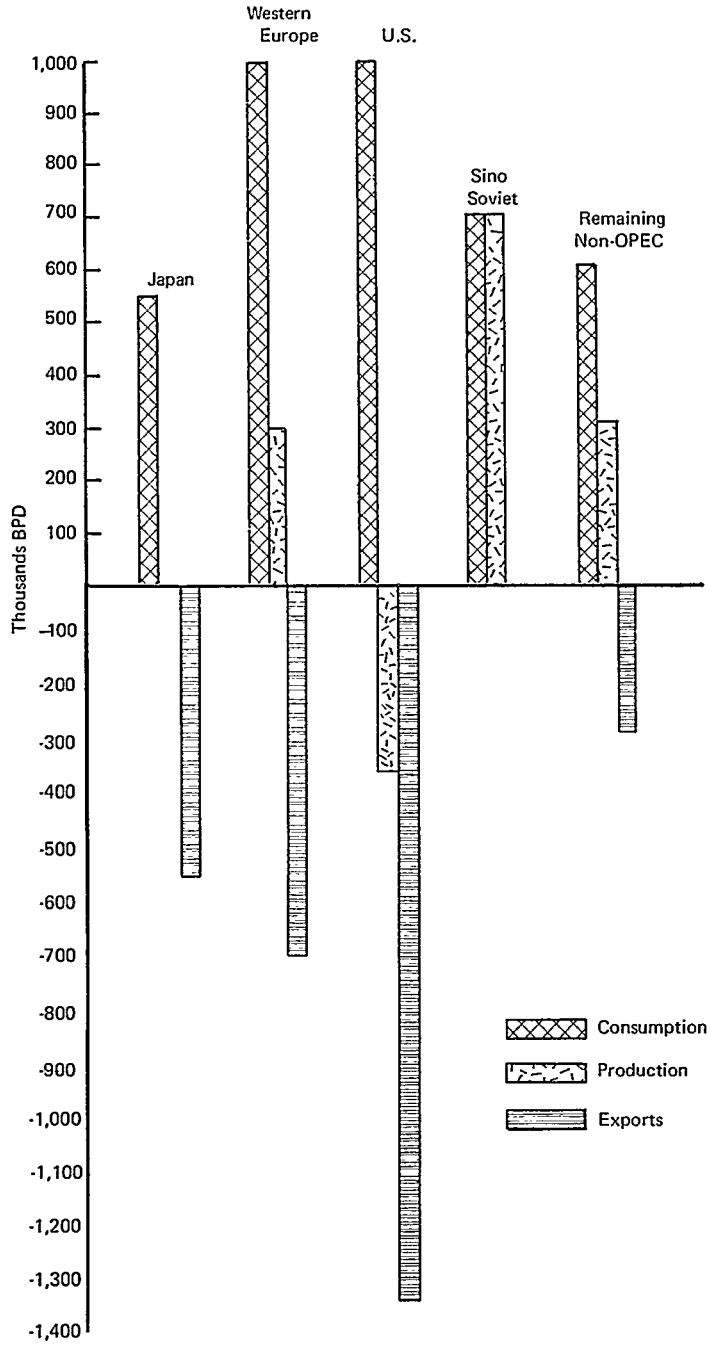

FIGURE 5 AVERAGE ANNUAL CHANGE IN CONSUMPTION/PRODUCTION/EXPORTS WORLD EXCLUDING OPEC

(THOUSANDS OF BARRELS PER DAY, 1973-75)

production, its growing requirements have been directly translated into an increased demand on world supply. Western Europe, which consistently placed the largest net demand on OPEC supply throughout the 22-year period of figures 1 through 4, is expecting some relief from the North Sea oil fields in meeting its growing requirements. Although in the period of the forecast it would still be increasing its needs for outside oil, it would have been at a lower rate than that which prevailed from 1970 to 1972.

The Sino-Soviet countries are marked by the consistent level of self-sufficiency they have shown. There appears to be little reason to expect that this will change over the foreseeable future unless increased trade resulting from *detente* places the group in the net export class.

The outstanding change of figures 1 through 5, however, is in the position of the United States. Its fairly stable growth in requirements for the first three periods was partially offset by growing indigenous production. But in 1970 a sharply different pattern began to emerge, which I see as intensifying had the Arab-Israeli war not occurred. The rate of increase in oil consumption began to accelerate in 1970. In that year the first evidence of the natural gas shortage began to develop and gas growth (previously the fastest growing of the fossil fuels in the United States) virtually stopped. Most of this latent demand was transferred to oil. The three consecutive annual estimates of natural gas pipeline curtailment[30] by the Federal Power Commission starting with the 1971-72 heating year imply an unsatisfied gas demand growing at the annual rate of 250 thousand barrels per day of oil equivalent. Widespread conversion by high-sulfur, coal-burning utilities to low-sulfur oil compounded the problem and I would estimate that the deterioration in automotive engine efficiency attributable to exhaust emission devices may have added 50 to 100 thousand barrels per day in average annual increase in oil demand. Thus the United States, which had given way to Europe as the largest element of growth in world oil consumption, is moving back—through accelerated consumption—to a comparable increment of oil demand growth.

30. Curtailment represents a pipeline's inability to meet its firm contracts, thus requiring an FPC-sanctioned reduction in previous contracted deliveries. The annual estimate of forthcoming curtailment is issued by the Federal Power Commission in a special release.

In contrast to Europe, however, United States domestic production appears to be entering a phase of decline. Thus the United States must import oil not only to satisfy its increased consumption but to make up for declining domestic oil production as well. While short-term forecasts of oil production are risky at best, my figure 5 estimates show a combined effect on United States import requirements of about 1350 thousand barrels per day annually, a level that is comparable to the entire world increase in oil demand as recently as the 1955 to 1962 period.

The shift in production relationships has been no less significant. In 1972, the eleven members of OPEC produced 53 per cent of the world's oil from 69 per cent of the world's proved reserves. Adelman correctly points out that much of the rest of the world outside of OPEC often operates at comparatively high reservoir depletion rates of seven to eleven per cent[31] so that a comparable level of production is supported by a much smaller relative reserve base.[32] However, oil production levels in high depletion areas are often unstable. Unless continuing exploration provides a high level of new discoveries to renew and increase reserves, production rates in such areas cannot be increased significantly and may actually go into decline. Since exploration in the consuming countries has not kept pace with demand, the burden of supplying growth has been steadily shifted to OPEC. In the 1950 to 1954 period, the eleven OPEC members supplied only 41 per cent of the increase in world oil production.[33] By 1970 to 1972 OPEC's share of the growth had risen to 63 per cent of the world increment, and the short-term forecast expectation was 75 per cent. Thus, increasingly OPEC is taking over the role of supporting growth in world oil consumption.

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31. Adelman, *supra* note 8, at 76.

32. The rate at which an individual oil reservoir can be produced or depleted initially depends both on the geological characteristics of the reservoir itself and the well spacing density in the field. A "high" depletion rate implies that the reservoir can produce 7 to 11 per cent of its reserve in a given year. To attempt to increase depletion rates above this rate is usually uneconomic since the additional producing capacity usually will have a much shorter economic life and may well add significantly to the overall costs over the life of the reservoir. At high depletion rates, oil reservoirs will usually be unable to sustain the initial producing level for any period of time and production will steadily decline thereafter to reservoir exhaustion.

33. *See* note 23 *supra.*

Observing the relationships within OPEC itself is even more revealing since it shows a further tendency to concentrate production increments in the countries with the greatest reserves, and most significantly within Saudi Arabia. Figure 6 shows the average annual changes in OPEC production for the same time periods as those of figures 1 through 5.[34] The first time period includes the supply rearrangements following the Iranian nationalization. The importance of Saudi Arabia, Iraq and Kuwait is evident in the first bar. With the formation of the Iranian consortium, and the resumption of Iran's place as a major Persian Gulf producer, the period of 1955-1962 was one of comparatively stable and balanced worldwide growth (the second bar of figure 6). The 1963-1969 period (the third bar of figure 6) saw the emergence of Africa as a major world producer with Libya showing the highest contribution to growth within OPEC for the period.

Late in 1969, King Idris of Libya was overthrown by a revolutionary government headed by Colonel Qaddafi, who adopted a much harder line on international oil operations. Exploration and development activities dropped off sharply. Production also declined from 1970 through 1972. The contribution of Nigeria, whose production increased substantially following the end of its civil war, together with some continued growth in Algeria, permitted Africa to offset the Libyan declines. The burden of supporting growth, however, shifted to the Persian Gulf.

Thus we come to the short-term forecast period of 1973 through 1975 (again on the basis of pre-hostilities trends). The resurgence in United States oil consumption coupled with an expected near-term decline in United States oil production capacity (and resulting production) placed an added demand on OPEC supply substantially in excess of Europe's partial relief from the North Sea. The expected result was to be a sharply increased demand for OPEC oil (see the fifth bar of figure 6). My estimates indicate an added demand for OPEC oil exceeding three million barrels per day annually, up from 1.9 million barrels per day in the 1970-to-1972 period. However, despite some successful Indonesian exploration, the contribution of the OPEC states outside the Persian Gulf area was not expected to be able to grow that significantly. Thus most of OPEC's, as well as the majority of the world's, incremental

34. For simplicity in graphing, Abu Dhabi and Qatar, Algeria and Nigeria, and Indonesia and Venezuela have been combined.

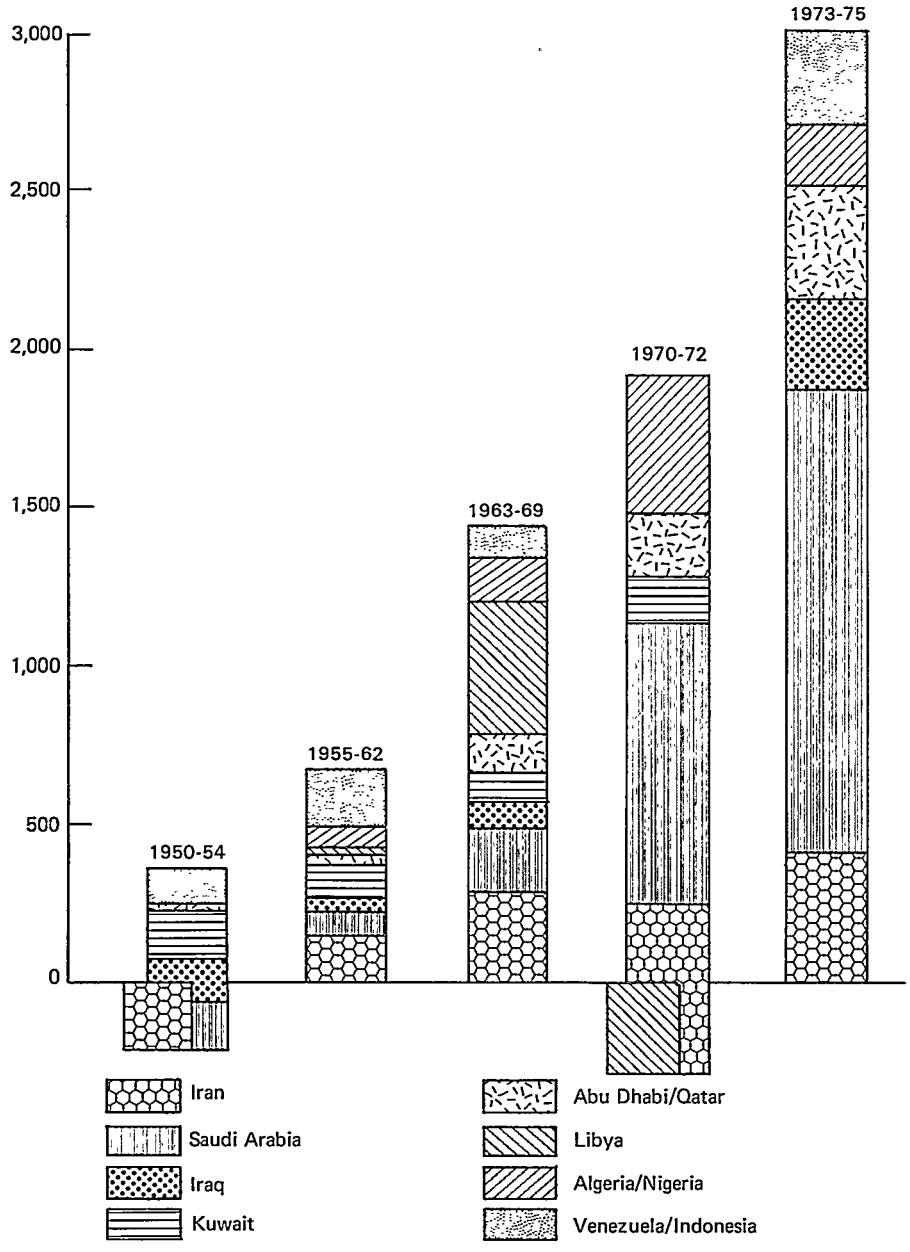

FIGURE 6 AVERAGE ANNUAL INCREASE IN OPEC PRODUCTION (THOUSANDS OF BARRELS PER DAY)

growth was expected to come from the Persian Gulf OPEC states. With Kuwait having made an internal decision not to expand beyond the three million barrels per day level, Iran and particularly Saudi Arabia were carrying the burden of world oil supply growth. For the twelve months ending June 1973, Saudi Arabia had increased its production by nearly 1.6 million barrels per day over the previous year, accounting for 35 per cent of total world production increases and nearly 40 per cent of total free world increments. Saudi Arabia's pre-Mid-East war expected annual increase of nearly 1.5 million barrels per day for the three year short-term forecast period is a greater annual increase in production than the world as a whole averaged in the period from 1955 to 1962.

The period of 1963 to 1969 was characterized by rapid European demand growth and by rapid production increases in North Africa. It was a period of limited strain on the tanker fleet, which is one reason the world was able to absorb the closing of the Suez Canal in the 1967 war with so little ill effect as actually occurred. By contrast the period of 1973 to 1975 was expected to see the shift of the dominant import requirement to the United States at the same time that Saudi Arabia was taking over the role of the major significant supplier. The effect on tanker requirements was expected to be very great, particularly given the lack of deep water port facilities in the United States.

One other market effect is worth mentioning. In general, Indonesian and African crude oils are low in sulfur. Venezuelan and most Persian Gulf crudes are high in sulfur. The rapid growth in Libyan production during the sixties coincided with the emergence of the worldwide environmental movement. From 1963 through 1969 nearly 42 per cent of the increase in OPEC supply was in low-sulfur crude oils.[35] With the Libyan cutback, only 17 per cent of the crude growth for 1970-1972 and 20 per cent of the forecast 1973-1975 increment are low-sulfur oils. As a result, the tight specifications imposed on sulfur in some of the consuming countries have created special supply, demand and pricing dislocations for some of the low-sulfur crudes.

35. The sulfur estimates have been made by classing total production for an individual OPEC country in either the high or low sulfur group. While there are some individual variations within countries, this is approximately correct. For production figures see note 23.

III. Changes in World Oil Reserves

Despite the publicity given to exploration and discovery in areas such as the North Sea, Indonesia and the Arctic, the major oil reserves—and reserve additions—remain in the Persian Gulf. It is difficult for most of the world outside the Persian Gulf OPEC countries to increase their reserves at sufficiently high rates to affect this balance to any significant degree. The reason for this is the widely differing relationship between exploratory activity and discovery results in the different geological areas around the globe. For example, the Ghawar field in Saudi Arabia—the world's largest—contains an estimated 60 per cent as much ultimately recoverable oil as all of the thousands of oil fields combined found in the continental United States since 1859. Clearly, massive exploration is not necessarily a substitute for fortunate geology.

The six Middle East OPEC members account for 50 per cent of the world's oil reserves. Table 2 shows both the reserves and average annual additions to reserves for each of the consuming blocks of figures 1 through 5, as well as for the Persian Gulf and other OPEC countries.[36] The average annual additions to reserves since 1960 imply that the world is increasing its reserves at the rate of better than 40 billion barrels per year. However, a substantial portion of that estimate represents extensions to and upward revisions of estimates for older fields. The extent to which present discoveries will be subject to similar extensions and revisions is doubtful, and if that is true the recent reserve addition rate may not be sustainable. The six Persian Gulf OPEC states have accounted for only 40 per cent of the reserve additions, although it is only fair to point out that very little exploratory effort was expended there.[37]

36. Table 2 is derived from *Oil and Gas Journal* annual estimates of reserves by country. There is no official agency for estimating world oil reserves such as the American Petroleum Institute in the United States. Other annual world estimates are available from *World Oil* and *International Petroleum Encyclopedia.*

37. Exploratory drilling footage in the six states is less than 0.5% of world totals.

TABLE 2
WORLD OIL RESERVES
(Billions of Barrels)

	Proved Remaining 12/31/72	1960-1972 Average Annual Reserve Additions
Japan	—	—
Western Europe	12	1.0
United States	37	3.6
Sino-Soviet	98	8.1
Remaining Non-OPEC	60	4.6
Persian Gulf OPEC	341	16.4
Other OPEC	119*	9.2*
World Total	667*	42.9*

Source: *Oil and Gas Journal*, International issues.
*The December 31, 1972, *Oil and Gas Journal* estimate for Algerian reserves is 47 billion barrels with the footnote "Revised Government Figure." This estimate is far higher than the *Journal's* 1971 estimate or those of *World Oil* and *International Petroleum Encyclopedia*. In my judgment such a high estimate is possible either by inadvertently including natural gas, natural gas liquids and oil in oil-equivalent barrels or confusing an oil-in-place figure with recoverable reserves. Using the more common 12 billion barrel figure for recoverable oil alone would give for reserves— Other OPEC: 84; World: 632; additions— Other OPEC: 6.5; and World: 40.2.

IV. THE ROLE OF GIANT FIELDS OF THE MIDDLE EAST IN WORLD OIL SUPPLY

One of the most striking features of the Middle East oil discoveries is how little exploration effort has been required to produce such sizable oil reserves.

The United States annually drills about 7,000 exploratory wells involving about 40 million feet of exploratory drillings. This exploratory effort discovers about 450 new oil and gas fields each year. Additions to oil reserves (exclusive of additions to natural gas) have averaged about 3.6 billion barrels per year since 1960. The exclusion of the giant Prudhoe Bay field on the Alaskan North Slope from the figures would reduce this to about 2.8 billion barrels per year.

By contrast, Aramco typically drills only two or three exploratory wells per year on its Saudi Arabian concession, involving at most 20,000 feet of hole. Most of these exploratory tests are productive and the annual reserve additions—according to *Oil and Gas*

Journal figures—since 1960 have averaged 8.4 billion barrels. While it can be argued that in the United States statistical relationships exist between exploratory activity and hydrocarbon discovery and econometricians can attempt to measure and forecast these relationships, there is not a meaningful statistical relationship between exploration and discovery in the major oil-producing countries of the Middle East. Flipping a coin one hundred times provides a statistical basis for predicting how many heads one can expect in the next one hundred flips. However, flipping a coin once provides no statistical basis at all for predicting whether the next flip will be heads or tails.

Exploration and reserves in the Middle East cannot be interpreted without an understanding of the role of the giant Middle East oil fields in the history of the Middle East. Two oil fields—Ghawar in Saudi Arabia (discovered in 1948) and Burgan in Kuwait (discovered in 1938)—account for one-third of all the oil that will ultimately be produced from presently known, proved reserves in the Middle East; seven fields account for half of the Middle East ultimate recovery while nineteen fields account for three-quarters of it. All nineteen are in Saudi Arabia, Iraq, Iran or Kuwait (including the Neutral Zone). Since the reserves are concentrated in so few fields, the question whether additional giant discoveries are possible necessarily influences the way in which the host governments view their oil resources. If, on the one hand, additional exploration would predictably produce new field discoveries similar in quality to historic ones, the current proved reserves of the Middle East can be regarded as merely an inventory subject to renewal as they are depleted. This is the view that has often been taken in the United States (at least until recently) where new reserve additions from exploration have continually replaced the depletion, through production, of existing reserves. It is clearly this idea that Adelman has in mind when he talks of the large reserves in the Middle East. "Depletion of reserves at the Persian Gulf is only about 1.5 percent a year. It is uneconomic to turn over an inventory so slowly."[38]

At the other extreme, if a country concludes that its known discoveries are the last significant ones it is likely to make from its resource base, it is no longer dealing with an inventory problem.

38. Adelman, *supra* note 8, at 76.

It is administering an irreplaceable capital asset. Such a country is likely to be very conservative in cutting prices to improve market share or to match price-cutting levels in order to retain market share. A.J. Meyer, the Assistant Director of the Center for Middle East Studies at Harvard, suggests some of the latter thinking in his original unedited letter reply to an Adelman article in the *Wall Street Journal*. He says, "[S]ome very sophisticated thinking now goes on in many Eastern Hemisphere oil exporting countries about the wisdom of leaving oil in the ground or pumping it out at maximum rates . . . . Many, curiously enough (while students in West Coast universities) have visited the Gold Rush ghost towns in Placer County, California, with rather more than the usual tourist curiosity."[39]

The extent to which discoveries appear renewable by exploration differs by country in the Persian Gulf. Some countries show a pattern of continued exploration and continued discovery but other countries show a deterioration in exploratory results and potential that suggests that they indeed may have seen the discovery of the bulk of their resources. These views are based on an observation of the progress of giant field exploration and discovery in the Middle East. The petroleum industry is increasingly recognizing that the bulk of reserves in the Middle East, as elsewhere, is concentrated in comparatively few fields. In the Middle East, the future of discovery depends more on the prospects for more giant field discoveries than it does on any statistical relationship between exploration activity and reserves added. Michel T. Halbouty, noted Houston geologist and independent oilman, was editor of the 1970 American Association of Petroleum Geologists' giant field symposium.[40] In his introduction, he comments, "Therefore, *the lesson is very plain*: giant fields keep nations in business, and it is towards such fields that we must direct our major efforts . . . ."[41] Halbouty recognizes that what is considered a giant field in the United States is small by Middle Eastern stan-

39. The quotation is from the original version of Meyer's letter before *Wall Street Journal* editing. For that portion that was published see the Wall Street J., Mar. 20, 1973, at 26.

40. The Geology of Giant Petroleum Fields (M. Halbouty, ed., Am. Ass'n of Petroleum Geologists, Tulsa, Oklahoma, Nov. 1970) [hereinafter cited as Halbouty].

41. *Id.* at 2.

dards. He mentions one suggestion that fields ten billion barrels and larger in the Middle East be classed as supergiants and those of one billion and larger be classed as giants. The extent to which giants and supergiants continue to be found in the Middle East holds the key to much of the future of oil discoveries in that area, as well as to each country's optimism about its ability to renew its "inventory" of proved reserves.

Utilizing the one and ten billion barrel definitions for giants and supergiants, I estimate that there are 53 giant oil fields in the Middle East today. Ten of these fields are in the supergiant category and contain an estimated 58 per cent of all of the oil that has been added to proved reserves in that area.[42] Of the ten supergiant Middle Eastern oil fields, three—Ghawar, Burgan and Safaniya/Khafji—are in a class by themselves and account for nearly 40 percent of the area's reserves. Of the ten supergiants, Saudi Arabia has four, the last of which was discovered in 1957.[43] The

TABLE 3
ESTIMATED ULTIMATE OIL RECOVERY*
IN THE MIDDLE EAST BY DISCOVERY PERIOD**
(Billions of Barrels as of 12/31/72)

	Ultimate Recovery* By Field Discovery Date					
	Pre-1950	1950-1959	Post 1960	Total	Remaining Reserves	Percent of Oil In Super-Giants
Saudi Arabia***	92	49	21	162	146	73
Iran	28	10	42	80	65	40
Kuwait***	65	18	4	87	73	75
Iraq	19	13	5	37	29	71
Abu Dhabi	—	3	19	22	21	0
Other Middle East	3	7	15	25	22	0
Total	207	100	106	413	356	58%
Number of Supergiants	6	3	1	10		

* Proved remaining reserves plus cumulative production.
** Based on *Oil and Gas Journal* Annual Reserves Estimates.
*** Includes half of Neutral Zone.

42. The analysis of reserves by size and by date of discovery in this section is taken from my reconciliation of *Oil and Gas Journal* estimates of individual field sizes contained in Halbouty, *supra* note 40, *International Petroleum Encyclopedia*, and the *Oil and Gas Journal.*

43. Oil industry speculation is that another of these fields—Khurais, Mazalij, Qirdi—first discovered in 1957, may be connected and may rival the world's

most recent of the ten supergiants is Marun in Iran, discovered in 1964.

My estimates of the present distribution of reserves by date of discovery are shown in Table 3. Roughly half of the Middle East estimated ultimate recovery is contained in fields that were found before 1950; about one-quarter was found during the fifties; the remaining one-quarter was found between 1960 and the present. Estimates of field sizes by discovery date are subject to an age bias since more recent discoveries are usually subject to upward revision since further drilling and a longer production history may improve the estimates of the oil contained in the field.[44]

In the Middle East, the largest fields were discovered quite some time ago and may not be subject to substantial upward revision, except as improved secondary recovery programs are put into effect. There has been a substantial upward revision of the estimates for these fields during the sixties as the estimators came to realize how large they really were. It seems less likely, with a few obvious exceptions such as Khurais in Saudi Arabia, that the more recent discoveries will go through the same belated recognition and receive the same future increases without new discoveries.

Table 3 indicates that six of the ten known supergiants were found before 1950, with three in the fifties and only one in the sixties. The supergiants account for 58 per cent of all the oil in the Middle East; in fact the six supergiants found before 1950 account for 44 per cent, suggesting that the odds of supergiant discovery

largest oil field, Ghawar, when fully developed. It is not included in these estimates as a supergiant since there has not yet been enough drilling on which to base a realistic estimate.

44. In order to assure consistency from area to area, as well as over time, the official reserve estimating guidelines in the United States used by the American Petroleum Institute and the American Gas Association are deliberately conservative. As a result, only about one-third of the reserves in the average field may be reported as proved in the year of discovery with most of the reserve added in later years through extensions and revisions. This conservative practice eliminates many of the uncertainties that go with trying to include speculative estimates of probable and possible reserves for newly discovered fields in the statistics. It also assures that present reserves will be increased in the future through extensions and revisions, even if there were no new discoveries. It may be dangerous to apply this same analogy to the Middle East, since there is no assurance that estimates in the technical journals use the conservative formulas of the API. My analysis indicates that some fields that would not yet qualify as proved API reserves are nevertheless included in the overall world estimates. This is not to criticize the journals. Indeed, when the API and AGA had to deal with the giant Prudhoe Bay on the North Slope, they appear to have bent their own conservative rules a bit

and the size of the supergiants may be deteriorating relative to earlier periods.

Nowhere is this more in evidence than in Kuwait. Its Burgan oil field was discovered in 1938 and for many years was believed to be the world's largest oil field. Despite subsequent exploration, that one discovery—made 35 years ago—still accounts for three-quarters of all the oil currently attributed to Kuwait and its half-share of the Neutral Zone.[45] For Kuwait, the idea that its reserves are renewable through exploration and discovery must be quite unrealistic. It is perhaps not surprising that Kuwait has become the first of the significant oil producers in the Middle East to limit its concessionaire to a fixed annual volume. The three million barrels per day limit imposed on the Kuwait Oil Company represents a low depletion rate but it does assure that the country will have a stable source of national income, providing prices do not collapse, well into the future despite the successes or failures that the country may have in utilizing its cash resources in the near future.

Iran provides a contrast to Kuwait. As a result of continued exploration, more than half of Iranian reserves are in fields found since 1960. Some of these have come in the old Iranian Consortium area but some are the result of joint venture operations by NIOC with other companies. Iran, too, is a contrast to Kuwait in the role of the supergiants. While it has three supergiants on the list, the largest—Gach Saran (dating back to 1928)—is little more than one-sixth the size of Saudi Arabia's Ghawar, for example. The Iranian pattern suggests that continued exploration will bring new discoveries but not those of spectacular size that occur on the other side of the Persian Gulf.

Iraq is something of a puzzle. As a result of continued disputes between the government and its principal concessionaire, Iraq Petroleum Company (and that company's affiliates), exploration activity was virtually nonexistent for many years. There have been some recently renewed activities involving the French and the Russians but so far results have been modest. Iraq's two supergiants

in order to avoid giving a ridiculously low estimate for the giant. In any case, however, application of United States practice to the Middle East giants is risky.

45. In the 1972 Kuwaiti debates over limitation of the Kuwait Oil Company's oil production, one group contended that total Kuwait—and Burgan—reserves have been badly overstated. Throughout this analysis, I have used *Oil and Gas Journal* data as a basis for my estimates because it provides some measurement of reserves and trends. Its limitations, however, should be noted.

were found in 1927 and in 1953.[46]

It is in Saudi Arabia, however, that the greatest future oil prospects appear to lie. The country's four supergiants alone account for about 29 per cent of all the oil that has been found to date in the Middle East and about 12 per cent of all of the oil that has been found to date in the world. Because of the very magnitude of the Saudi oil discoveries, exploration appears to take place at a very leisurely pace. Discoveries once made may not be developed for quite a period of time, until earlier prolific discoveries have been brought into production. Thus the failure of Saudi Arabian reserve estimates in Table 3 to show the magnitude in the fifties and sixties that are shown for pre-1950 discoveries may largely reflect the slow pace of development in the country.[47] If it is the discovery and development of the large supergiants that shapes the future of oil reserves in the Middle East, it must be concluded that the prospects are best in Saudi Arabia for substantial increased reserves. They do not appear very attractive in Kuwait. The patterns in Iraq and Iran for different reasons would have to be viewed as intermediate.

Adelman's paper presents the argument that exploration is indeed renewable at comparatively high levels. He says, for example, "It is worth assuming arbitrarily that in the future, supply will tighten. The worst that can happen is zero new discoveries."[48] In his calculations, however, he estimates that presently known reserves will be increased by 50 per cent, "recognizing that reserves in fields known in 1971 can be expanded by development and discovery of new pools in old fields. The assumption of 50% expansion is highly conservative in the light of American experience, considering also that probably most Persian Gulf reserves (like most production) are in fields discovered in the last twenty

46. Industry rumors suggest that Iraq's reserves may be underestimated. Again, my figures are based on *Oil and Gas Journal* estimates for consistency.

47. The history of the development of Ghawar, for example, is one of occasional discoveries (dating back to 1948) of what were originally thought to be isolated new fields. Until Abqaiq, Saudi Arabia's 1940 supergiant, was fully developed, there was little pressure to develop Ghawar. Only then was it finally confirmed that the isolated discoveries were all one giant oil field. A similar pattern may now be taking place in Khurais, first found in 1957. Recent discoveries at Mazalij and Qirdi are now believed to be interconnected in another giant oil pool.

48. Adelman, *supra* note 8, at 74.

years."[49] Adelman's zero discovery model implies about ten billion barrels added per year until 1985 in the Middle East to existing fields through extensions and upward revisions.

This estimate appears to be a not unreasonable "worst case" when applied to the way in which the trade journals have increased their estimates of the early Middle East supergiant countries. But if the newer discoveries are not of supergiant calibre, it may be dangerous to assume that the trend can be extrapolated into the future. In such a situation, Adelman's "worst case" has substantial concealed optimism buried within it. Table 4 represents my estimate over the period since 1960 of the average annual Middle East reserve addition rate divided between extensions and revisions of fields discovered before 1960 compared with discoveries made since 1960. The average annual Middle East reserve addition rate, derived from the annual *Oil and Gas Journal* reserve estimates by country, has been 17.7 billion barrels per year. Of that, 16.4 billion barrels per year have been added in the Middle East OPEC countries with other Middle East countries—particularly Syria, Dubai and Oman—contributing the remainder. Saudi Arabia and Iran have accounted for two-thirds of the reserve additions in the Middle East during this period. It is important to note that most of the reserves added in Iran since 1960 have come from discoveries rather than from updating old fields. In examining the extension and revision rates for pre-1960 fields (which Adelman assumes will continue for the more recent fields) it is evident that most of the increase is in Saudi Arabia and Kuwait, the countries that contain the three largest of the supergiant fields. This suggests that much of the extension and revision activity over the past decade has been a belated recognition of the magnitude of Ghawar, Burgan[50] and Safaniya. This raises the legitimate question of how many of the newer fields are in the supergiant class and can provide the basis for Adelman's "conservative" future extensions and revisions. At the moment, Khurais in Saudi Arabia appears to be one candidate. That would add to Saudi Arabia's already impressive reserve position.

49. *Id.*

50. If the Kuwaiti estimate that Burgan is overstated proves correct, Kuwait will be subject to future *negative* revisions.

TABLE 4
MIDDLE EAST—AVERAGE ANNUAL RESERVE ADDITIONS
1960-1972 Inclusive
(Billions of Barrels)

	13 Year Average Annual Additions		
	As Extensions and Revisions Of Pre-1960 Fields	In 1960 and Later Fields	Total
Saudi Arabia*	6.8	1 6	8 4
Iran	0.2	3 2	3 4
Kuwait*	1.4	0 3	1 7
Iraq	0.4	0.4	0.8
Abu Dhabi	0 2	1 5	1.7
Qatar	—	0 4	0.4
Subtotal Gulf OPEC	9.0	7 4	16.4
Non-OPEC Middle East	0 6	0 7	1 3
Total Middle East	9.6	8.1	17.7

Based on author's reconciliation of published individual field estimates with annual *Oil and Gas Journal* reserve estimates by country.
* Including half of Neutral Zone.

The importance of Table 4 is that it suggests that the Middle East is a case of the rich getting richer—in Iran's case by continued exploratory effort and discovery of new fields; in Saudi Arabia's case by slowly unveiling the sheer magnitude of its resource base. Kuwait may well be out of the running for future giant discoveries and if the pessimistic view of Burgan field reserves is accepted, may even be downgraded. Iraq must be counted as something of an unknown given its political and exploratory history. No other area of the Middle East has yet to produce a single supergiant despite active exploration in some of these areas.

V. THE ADELMAN-AKINS DEBATE

Adelman's view that the changed world oil situation is evidence not of shortage but of the operation of a government-company cartel was widely publicized following the publication of his book, *The World Petroleum Market*, and his *Foreign Policy* paper. His thesis has received much counterargument from sources both within and without the oil industry. One of his chief opponents, James E. Akins, moved from the State Department to the White House Staff late in 1973 to start drafting the President's April energy message. Akins is now United States Ambassador to Saudi Arabia. Akins' own paper, "The Oil Crisis: This Time the Wolf is

Here," is in part an explanation of State Department actions in the period of 1970 to 1971 (of which Adelman is highly critical). Also, it lays out the argument for an expected concentration of world oil supply in a limited number of Persian Gulf states in the coming few years.

Adelman's basic argument rests on the observation that there is a substantial world oil surplus concentrated in the Middle East and that real costs of expanded production are very low. Akins in effect concedes this point in his analysis by saying, "And indeed it is agreed on all sides that there is no question of a physical shortage of fuel in the world up to 1980 or 1985, at costs of production comparable to today's."[51] He goes on to state, however, "but to sustain the view that physical supply and costs are decisive, one must assume that the world's oil is distributed uniformly, at least so that adequate amounts will always be available to all users, in all circumstances and at reasonable prices. This has been an assumption that has never been well founded."[52] Thus Akins lays the groundwork for the argument that there is concentration in world oil reserves in the major Persian Gulf producers and that increasingly they will dominate world oil production. As for his version of what happened in 1970, he goes directly back to the Libyan test of world oil supply and states, "But these points were incidental to the fundamental fact, which was that a threat to withhold oil [by Libya] could now be effectively employed to produce higher prices. Hindsight suggestions as to how that threat might have been countered either by the companies or by the American or other governments, seem to me quite unrealistic and the charge that the State Department by inaction was to blame for creating a new monster is, in simple terms, nonsense. The Libyans were competent men in a strong position; they played their hand straight and found it a winning one."[53] Thus, Akins contends that the Libyan test added a new dimension to world thinking about oil supply and demand. In his words, "I dwell on the 1970 Libyan demands and their success, primarily because they demonstrated, like a flash of lightning in a summer sky, what the new situation was . . . ."[54]

51. Akins, *supra* note 9, at 465.
52. *Id.*
53. *Id.* at 472.
54. *Id.* at 471.

In his analysis of the supply situation and the physical surplus of reserves in the Persian Gulf, Adelman concentrates on total Persian Gulf reserves without making an attempt to break out individual countries. Akins does make such production estimates for selected countries for the years 1975 and 1980. His estimates show Saudi Arabian production in 1980 at twenty million barrels per day out of a free world total of 85 million barrels per day. Adelman has not made such a specific country forecast, so it is not possible to determine the extent to which he expects production growth to concentrate in individual countries. It is possible, however, to extend his estimate by using plausible assumptions about where within the Middle East reserve additions will occur and by making the further assumption that all countries will approach the same higher reserve depletion rate in 1980.

It is thus possible to place both Akins' and Adelman's projections of average annual production increases on an individual country basis. These summaries, together with the actuals for 1971-1972 and the twelve months ending June 1973 are shown in Table 5. All four of the projections show Saudi Arabia accounting

TABLE 5
ESTIMATED AVERAGE ANNUAL PERSIAN GULF PRODUCTION INCREASES
(Millions of Barrels per Day)

	Actuals			Adelman		
	72/71	12 Months Ending June 73/72	Akins [b]	Low [c]	High [d]	20:1 [e]
Saudi Arabia [a]	1.25	1.59	1.8	0.9	1 4	1 4
Iran	0.49	0.81	0 6	0.1	0 3	0 3
Kuwait [a]	0.09	(0.05)	0 1	0.3	0 4	0 6
Iraq	(0.25)	0.08	0 4	0.1	0 1	0 3
Abu Dhabi	0.12	0.27	0 4	0.1	0 2	0 9
Other Middle East	0.09	0.23	0.1	0 2	0 4	
Total Middle East	1.77	2.92	3 4	1.7	2 9	3 5
1980 Middle East Production	—	—	45 0	31 6	41 4	46 0

a. Includes half of Neutral Zone.
b. Derived from Akins, *supra* note 9, at 480.
c. Derived from Adelman, *supra* note 8, at 74 (assuming reserve additions proportional to reserves and all countries producing at same depletion rate in 1980).
d. Derived from *id.* (assuming reserve additions proportional to recent reserve addition rate and countries producing at same depletion rate in 1980).
e. Derived from M.A. ADELMAN, *supra* note 11 (Table VIII-4) (assuming 1980 production equals Adelman's 20:1 reserve-to-production ratio case, with no reserve additions).

for at least 40 per cent of the production growth for the Middle East. The Saudi share of the actual change from 1971 to 1972 was 71 per cent. Thus one can conclude that if underlying reserves will influence the share of the oil market at all, Saudi Arabia is due for a lion's share of Middle East growth. How different a 1980 Saudi Arabian disruption would be if that country were producing twenty million barrels per day from the Iranian disruption of 1951 involving only 600 thousand barrels per day. It is particularly so in view of the estimate that half of the presently known, ultimately recoverable Middle East oil was already discovered by 1950 with the supergiant fields of Iraq, Saudi Arabia and Kuwait being hardly utilized at all. That is not likely to be the situation in 1980 when most of the rest of the world will be producing at physical limits from known proved reserves and the only potential production increases would have to come from three or four countries in the Persian Gulf. Akins' summary of the situation is, "The United States now has no spare capacity and within the next few years, assuming other producer governments and companies do not invest in huge added capacity, the production of any one of seven countries—Saudi Arabia, Iran, Iraq, the Federation of Arab Emirates, Kuwait, Libya or Venezuela—will be larger than the combined spare capacity of the rest of the world. In other words, the loss of production of any one of these countries could cause a temporary but significant world oil shortage; the loss of any two could cause a crisis and quite possibly, a panic among consumers."[55]

Because the Adelman and Akins interpretations appear to be so strongly in opposition, it is possible to overlook some substantial areas of agreement, or nondisagreement. They appear to agree that there will be no worldwide physical shortage of oil before 1985 and that real costs of production in the Middle East are low.[56] Although Adelman does not address the question of country concentration directly, his estimates appear completely compatible with Akins' view of the potentially dominant future role of Saudi Arabia, and to a lesser extent, of Iran. Thus the differences appear to lie not in the realm of shortage, but in the interpretation of what this means to supply, demand and price, and in the roles of the companies and governments.

55. *Id.* at 468.

56. Neither one appears to have addressed the possibility that the perception of possible future shortage may cast its shadow well before physical shortage occurs, thereby influencing the actions of the various governments.

VI. CARTEL, OR EMERGING RESOURCE MONOPOLY?

At its founding and sporadically thereafter, OPEC considered the concept of production programming. The idea was modeled after the operation of market demand proration within the major oil-producing states in the United States. The Texas Railroad Commission and the Louisiana Conservation Commission (as well as several other state bodies) have historically estimated the demand for their crude oil and then apportioned that demand to all producers in the state according to special formulas based on "allowables."[57] Although the original purpose of the system was conservation, or the prevention of physical waste, market demand proration effectively prevents any individual operator from producing to an oversupply situation. It has thus been widely criticized by economists since it tends to nullify the supply/demand relationship to price and prevents surpluses from driving prices downward. OPEC clearly viewed production programming as one way of preventing the world oil surpluses and resulting price weakness that the governments reacted to in 1960. In the recurrent discussions on production programming, OPEC members found it difficult to agree on a formula that would be suitable to all, and the program was never worked out.

The focus in Texas and Louisiana is on control of the individual producer. The focus in the proposed OPEC production programming scheme was to be on control of the producing country with its own oil companies limited to the country share. Within the United States the producing states have never had an overt goal of price regulation. By contrast, OPEC's intentions were at a minimum to prevent the erosion of oil prices, if not to provide a mechanism by which they could be increased.

OPEC's problem in trying to institute production programming was a different type of problem than that which the states encounter in market demand prorationing, since its goal was to regulate the rate of production among eleven OPEC member states, whereas the conservation authorities deal with thousands of individual producers. In a world in which substantial oil surpluses were taken for granted, the problems were viewed as similar—finding a formula to allocate production in times of surplus.

57. For a discussion of market demand proration in the United States see S. MCDONALD, PETROLEUM CONSERVATION IN THE UNITED STATES (1971).

By focusing their attention on the way in which individual state conservation commissions, such as the Texas Railroad Commission, controlled a multiplicity of producers, OPEC members seem to have been less aware that there is no mechanism in the United States for apportioning production market shares among states. While various state officials meet from time to time in the Interstate Oil Compact Commission to discuss common petroleum problems, that body has no regulatory functions. There is no mechanism for assuring that Louisiana or Texas does not attempt to change its market share relative to other states. The reason for this has been fairly clear. Most states, including such important states as Wyoming, California, Illinois and Colorado, make no attempt to prorate to market demand. In recent years, the exploratory effort of the rest of the country has never been able to generate enough crude oil reserves with enough producing capacity to seriously undermine market shares of Texas and Louisiana (which in recent years combined have been about 60 per cent of the total). Thus when the Texas Railroad Commission determines the market demand for Texas oil, it is first conceding to all others what share of market the other states want to take before Texas makes up the remainder. The same practice occurs in Louisiana. Temporary increases or decreases in producing levels by everyone else are absorbed by the large states of Texas and Louisiana. While there has been occasional friction between Texas and Louisiana over the way in which the other administers proration (and the proration system threatened to break down altogether prior to the imposition of mandatory import controls in 1959 when oil began to flood in from overseas), the system has functioned to balance supply and demand despite a lack of organized coordination between the states.

Thus, OPEC's attention may have been misdirected. Rather than assuming, as it did, that Saudi Arabia and Iran were competing producers, requiring that OPEC assume the role of the Texas Railroad Commission, it might have taken a different view. As surplus producing capacity elsewhere around the world dries up, increasingly Saudi Arabia becomes analogous to the Texas Railroad Commission itself, and perhaps Iran becomes analogous to the Louisiana Conservation Commission. In that case OPEC would be relegated to the role of a noncoordinating body such as the Interstate Oil Compact Commission. All this takes is a willingness of Iran and Saudi Arabia to absorb the variations in supply as other producers attempt to carve out growing market shares or

begin to fall behind. This idea was not credible prior to 1970. It is very credible today.

Adelman's thesis assumes that governments, like companies, will be motivated by competitive commercial considerations. He argues that if the companies were removed from their roles as crude oil marketers and as "tax collectors of OPEC" and the producing nations became the sellers of the crude "the cartel would crumble."[58] There are a number of reasons why governments may not be as aggressively motivated as companies to shave prices to improve market share, or to meet discounts to prevent erosion of market share. For one thing, their financial motivation may well be quite different.

The decision to select a producing capacity level when developing an oil field is a different type of decision from the usual manufacturing capacity problem. Since the ultimate size of the reserve, within broad limits, remains the same whether it is produced at a high or a low depletion rate, the decision to invest in order to increase capacity inevitably shortens the producing life of the field. Since current accounting costs and profit margins are of limited help in deciding whether to invest more now to get money back faster, companies usually rely on discounted cash flow or present value techniques of profit measurement because of their sensitivity to the time value of money. A company using a high rate of return cutoff for investment decisions will tend to opt for higher depletion rates because of its sensitivity to the speed with which it gets its money back. Conversely, a government whose marginal use of its cash revenues involves putting it in a bank for ordinary interest rates may find less incentive to deplete its reserves at high rates if in so doing it threatens the price structure on existing production and present revenues. A.J. Meyer, in his aforementioned original letter to the *Wall Street Journal*, commented, "Saudi Arabia . . . has for 25 years been distinguished by a preference for U.S. banks, by an ultra-conservative investment policy, and by an unwillingness even to stray into the speculative quicksands of Triple 'A' bonds."[59] Clearly, that is a different view of the time value of money—investing more to get money back faster—than that of many of the independent oil companies, which often have competed the price of oil down.

58. Adelman, *supra* note 8, at 87.
59. *See* note 39 *supra*.

There is one other important economic difference that distinguishes governments from company concessionaires in the decision to produce more now rather than later. It also argues that companies may be more prone to commercial competitive pressures than governments. The lives of company agreements with producing governments are nearly always limited. For most of the OPEC countries, the agreements expire well before much of the presently known oil will be gotten out of the ground. Thus a company has a temptation that a government need not have, that is, to produce an extra barrel of oil today rather than to leave it to revert to the government tomorrow.

If companies may have stronger financial motivations than governments to recover their money quickly by high production rates even at the risk of price erosion, some governments have very little need for the cash—as distinct from the reserves of black gold—because of the nature of their economies. Amuzegar[60] places the OPEC governments in three categories. The first group, which includes Algeria, Indonesia, Iran, Iraq, Nigeria and Venezuela, are net debtors now and will need all of the oil money they can get for industrial development at home. Amuzegar places Kuwait and Libya in a second group as net creditors with limited expectations of growth in either revenues or revenue requirements. Amuzegar's third group includes Qatar, Saudi Arabia and the United Arab Emirates (principally Abu Dhabi), which he expects will grow substantially but have little domestic need for the increasing revenues. Thus ironically two of the three countries with the largest Persian Gulf reserves are not in need of the cash that they might expect to gain from aggressive competitive behavior.

The final piece of the puzzle on motivation must certainly be the most difficult of all—seven out of the eleven OPEC members, comprising more than three-quarters of its proved reserves, are Arab states and thus in varying degrees involved in the highly political Arab-Israeli dispute. The idea of utilizing Arab oil as a political weapon against countries that support Israel has been a common part of Arab rhetoric for several years. When the oil weapon was tried in the 1967 war, it met with a notable lack of success. But if the conventional economic wisdom—that world oil surpluses were too great for individual country manipulation—was successfully challenged in 1970, its political counterpart must have suffered

60. *See* note 13 *supra* and accompanying text.

substantially at the same time. Indeed, the events of October and November 1973 suggest (as of this writing) that we may be witnessing a successful political reenactment—run from the Persian Gulf rather than from the Mediterranean—of the 1970 economic test of the conventional wisdom. As of this writing, the final outcome is not yet clear, but the oil weapon is clearly working better than it has before.

To apply a common competitive commercial motivation to all three of the biggest Persian Gulf oil producers is dangerous. Two of the three countries, Saudi Arabia and Kuwait (like the three smaller producers) are Arab although Iran is not. The exploration patterns suggest that Kuwait may in fact have found the bulk of its oil and is now in the position of converting finite oil reserves into cash reserves. If Kuwait had a large number of skilled entrepreneurs who could invest in enterprises throughout the world and earn a high rate of return, one could argue that the country should be converting oil into cash for investment purposes. But if it would only use the cash for bond investments in a world in which inflation and currency devaluations are common, one can question whether oil reserves are not a better investment *as long as one expects the prospects for oil values to rise.* In that sense, black gold—in a perceived period of shortage—may be like yellow gold, a conservative haven for national monetary reserves.

The second largest reserve position in the Middle East is held by Iran. It is not an Arab country, but, unlike the other two, has a substantial capacity to absorb all its growing revenues within the country. Since much of Iran's added oil production appears to have to come from exploration, as distinct from the further development of supergiant fields, a key question for Iran is the extent to which it wants to recycle its own money into oil exploration rather than utilizing foreign capital to free some of its current cash flow for more development at home.

Finally, we come to Saudi Arabia—the country whose reserves and prospects are the world's greatest. It is Arab, and of all the countries in the world, seems most likely to be able to generate cash flow far beyond its current ability to invest.

In light of recent rates of worldwide growth in oil consumption and in rates of exploratory discovery elsewhere, it is difficult to picture a set of circumstances in which Saudi Arabia would not be expected to grow in production, in revenues and in market share. The chief question is, to what extent? To expect Saudi Arabia to

behave according to the competitive commercial model may simply not be realistic. Adelman has quoted from statements by Sheikh Ahmed Zaki Yamani, the Saudi Oil Minister, about the advantages of keeping the companies in participation with the OPEC governments to avoid intergovernmental competition. But most of those statements occurred before 1970 when the countries assumed that the OPEC organization had to act in the role of production programmer for competitive countries. The concept that Saudi Arabia, itself, could play the role of Texas and absorb surpluses and shortages of all the other states had not yet dawned on the OPEC members. The concept of government-company cartel may in fact be a pre-1970 concept. The view of Saudi Arabia and Iran playing the Texas and Louisiana of the world without price-destructive competition is very plausible by 1980. It may not be so difficult for them to behave in that manner before that time if they have concluded that that is the eventual outcome.

Amuzegar sums up the opposing view of Adelman's thesis when he says,

> It is indeed amusingly paradoxical that the organization itself [OPEC] is often credited by its critics with so much clout in setting oil prices, imposing participation conditions, putting political pressure on uncooperative nations and even denying Western access to its resources. Yet its individual member governments are expected to act impetuously and irrationally in cutting their own throats and those of their former allies after OPEC's fall. Not only do OPEC leaders fully realize the futility of such actions now; even in their sophomore years at Harvard and Cornell, they knew that no producer of an irreplaceable commodity (who can sell all he can prudently produce at the going or higher prices) is ever going to lower his price no matter how competitively he may be expected to act.
>
> Oil is just such a commodity in the present energy situation. Even an elementary oligopoly matrix, portraying the behavior of a few rival sellers, suffices to show that for prices to follow an upward trend, no formal collusion or concerted action is essential: every smart seller, mindful of the reactions of his rivals, will find it ultimately suicidal to undercut them. Not to grant OPEC leaders this much instinctive sagacity would be the height of incredulity, if not the dawn of prejudice.[61]

This statement might have been dismissed as rhetoric in an era

61. Amuzegar, *supra* note 13.

when oil was viewed as in a surplus so great that no one country could affect supply and demand. But in an era when that conventional wisdom may have been disproved—an era of emerging resource monopoly—it must be taken seriously.

VII. Where Do We Go From Here?

In the early days of industrialization in the United States, giant combines with great market power developed in a number of industries, such as oil, steel and railroads. Out of that era arose a body of domestic law and regulation that sought to define the limits within which those organizations could function in the economic life of the country. The Sherman and Clayton Acts formed the basis for antitrust law. Regulatory agencies such as the Federal Power Commission, the Interstate Commerce Commission and the Federal Trade Commission were formed to regulate the excesses of the private sector. We may now be witnessing the first development of a "cornered market" in world oil but we lack the international institutional mechanisms to deal with it.

Adelman has suggested that getting the companies out of crude oil marketing will bring about competition and put the lid on prices. If, as I believe, very few countries have the potential to expand producing capacity that significantly or that rapidly, we have an oligopoly of production growth potential now, with the possibility of it becoming a near monopoly in a matter of years. In such a case, getting the companies out would accomplish little but disruption of the normal planning process for tankers, refineries and other logistical facilities. Even worse, by diverting attention from the real problem, it would postpone the day when we would realize that we must settle down to find some international mechanisms to deal with such concentrations of natural resource power in the world.

The producing countries argue that their per barrel revenues have not (until recent events) kept pace with the rate of worldwide inflation and that their own rate of internal development is suffering. Indeed, for more than half of the OPEC members, the argument has a strong ring of validity. They have argued recently that they want "market prices" for their oil. But what is a market price if a few sellers, by the act of entering the market or by hanging back can themselves influence supply, demand and price? Clearly, if the marketplace in oil is a nostalgia of an earlier period, something must be found to take its place.

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Most present proposals look to some other organization or other area of economic life for a model to apply to international oil. OPEC itself suggests an obvious model in an Organization of Petroleum Importing Countries (OPIC) to act as a countervailing power to OPEC. Walter J. Levy, the United States petroleum consultant, has been an advocate of this approach, suggesting that the industrialized nations get together and "arrange for stockpiling, rationing, and equitable sharing of import availabilities in case of an emergency."[62]

There have been two basic objections to this approach. First, OPEC itself took a long time to mature. In fact, it has been suggested that OPEC is much weaker than it appears since it gets credit for the successful actions of lead members such as Saudi Arabia and Iran, without which it would be ineffective. That being the case, the time, negotiations and organizational problems in OPIC's formation are formidable indeed, as early attempts at OECD oil coordination have suggested.

The second argument has been voiced by Sheikh Yamani and stated by several oil company managements as well. The formation of OPIC would be a hostile act to OPEC and would only exacerbate the already strained relations between producing governments and consumers. If we have the power, goes the argument, the consuming governments will only lose by this act of confrontation. The argument for avoiding the hostile act must be deemed to have lost some of its force, however, by the act of the Arab oil embargo.

The concept of OPIC tends to assume a bargaining role between two supergovernmental agencies. A version with somewhat less potential for direct confrontation is the model of labor-management bargaining. OPEC might still negotiate with the companies as it has been doing, but governments would have a more direct role in observing and influencing the companies. Such an approach would require the same mutual contingency planning—stockpiling, backup rationing programs and mutual sharing—of the OPIC proposals but would avoid the direct agency-to-agency bargaining approach that risks ending in political confrontation. The contingency planning would enable the consuming governments to "take a strike" more effectively than they can now. Given the lack of coordination among consuming governments that

62. Oil Daily, Oct. 17, 1973.

has been brought to light by the Arab oil embargo, it, too, would be difficult to implement.

Several recent proposals by the company executives seem to look to an international analogue of the United Nations to take over the coordination of energy supply among countries. Thornton Bradshaw of Atlantic Richfield and G.A. Wagner of Royal Dutch/Shell have both proposed an international organization for energy coordination, perhaps modeled on the United Nations. Clearly, nothing can be done about this until peace is restored to the Middle East and the aftermath of the 1973 war is ended. It deserves careful study. However, it is far from clear how such an agency could operate effectively, particularly if one observes the trials and tribulations of the United Nations itself in international peacekeeping.

One idea that appeals to me, but which has not been very well thought through, is to develop some international energy-pricing system modeled after international monetary agreements as they were put into effect at Bretton Woods. This could not be done until some bargaining balance was struck between the oil producers and the oil consumers. Specific models that might be examined include the role of the stock exchange specialist in stabilizing prices, the Federal Reserve Board in its monetary activities, or the United States Government in its offer to exchange gold for dollars at a price. The United States, which hopes to be able to develop its own coal gasification, coal liquefaction and shale oil resources (as well as nuclear power) might play a key role in entering the market to sell oil to its own companies at a pegged price, thereby keeping them from driving up international prices by their own actions, if it deemed that international prices were getting out of line with long-term alternatives. The details would be complex but the concept deserves study.

If we have truly entered a new era in international energy competition in which the old idea of competitive price mechanisms is dead or dying, the world has a tremendous job in store to find the new answers. Now is the time for doing something about it.*

* *Author's Postscript*: This paper was written during the month of November 1973. Since events were moving so rapidly at the time, I rejected the idea of trying to keep it current through continual rewriting, electing instead to hold the paper to an early December informational deadline. Changes in international oil since that time have been substantial and significant. Tax levels on Arabian light crude oil (OPEC's "Marker crude oil" for pricing purposes) were raised to $7 per barrel at an OPEC meeting held December 23 in Teheran, despite some suggestions in those meetings of levels as high as $22 per barrel. This has placed an unprecedented strain on the potential balances of payments between producing countries and consuming countries. The embargo has been effective enough to cause worldwide oil shortages, although they do not appear to be as bad as some consuming governments initially feared. And the concern in the consuming countries for the problem has brought them together in meetings in Washington in early February in the first open effort at coordination of consuming government oil policies. Despite the magnitude of the changes which have occurred since early December, however, I do not believe that they require any fundamental change in the basic analysis of this paper, which remains as valid in March as it was in December.