



The Future of the International Oil Market

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of the
International Oil Market**

Edwin A. Deagle, Jr.

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Author's Note

Dr. Edwin A. Deagle, Jr. is Director of International Relations, The Rockefeller Foundation, New York, and is responsible for program development in world energy, international economic affairs, regional conflicts and international security. A graduate of the U.S. Military Academy and the John F. Kennedy School of Government, Harvard University, Dr. Deagle has held a variety of program planning and budgeting positions in the United States Government.

The Future of the International Oil Market

Introduction

The world is still in mid-passage from an energy regime of low cost gas and oil to another based on higher cost energy. The passage thus far has been full of surprises. Since 1974:

New supplies of energy other than oil or gas have come to the market much more slowly than expected.

Conservation in response to higher oil prices has been much more effective than expected.

Political instability in the Middle East initially played a more significant role, and later a less significant role in the oil market, than expected.

Availability of oil supplies has been much better than expected.
Oil prices have risen and then fallen more than expected.

Indeed, since the Group of Thirty came into existence (1978), conditions in the oil market have changed three times. First, the revolution in Iran in 1978 removed 5 million barrels per day (MBD) of oil supplies from the market for two months or so, and real oil prices more than doubled. Thereafter, war between Iraq and Iran in 1980 removed 4 MBD from the market for nearly half the year but real oil prices changed very little. Today the war continues, yet demand for OPEC oil has fallen by nearly 50 percent since 1979, declining by 4 MBD each year in 1980, 1981 and 1982. Real crude oil prices since the beginning of 1981 have fallen by about 25 percent.¹

¹ In most of Europe and Japan, however, real oil prices rose in 1981 and 1982 because of the dollar's strengthening in foreign exchange markets. See Appendix 1.

Price and volume movements such as these are common in commodity markets. But the oil market is not simply another commodity market. In terms of value, oil is the largest internationally traded commodity in the world, comprising about one-fifth of world merchandise trade. The oil business is big business indeed, and its relationship with the world economy is therefore a powerful one.

This report examines that relationship and its consequences, and explores what might be done to improve the functioning of the oil market and its interaction with the world economy. The report results from discussions held over a three-year period by members of the Group of Thirty study group on energy and the world economy. The study group was formed in early 1980 under the supposition that oil market conditions are of vital concern to both oil exporting and oil importing countries, and since that time its members have sought to identify common interests among oil exporting and oil importing countries.

The members of the study group, all of whom participate in a personal capacity, are:

- H. Johannes Witteveen**, Chairman, Group of Thirty and former Managing Director, IMF (Chairman of the Study Group)
- Abdul Aziz Al Quraishi**, Governor, Saudi Arabian Monetary Agency
- Ali Khalifa al-Sabah**, Minister of Oil, Kuwait
- Roberto Campos**, Senator, Federal Republic of Brazil; former Ambassador to the United Kingdom; former Minister of Planning of Brazil
- Dirk de Bruyne**, Director, Royal Dutch/Shell Group
- Richard Debs**, President, Morgan Stanley International and former Chief Administrator, Federal Reserve Bank of New York
- Andre de Lattre**, former President, Credit National; former Deputy governor of the Banque de France
- Otmar Emminger**, former President, Deutsche Bundesbank
- Nurreddin Farrag**, Managing Director, Arab Petroleum Investment Corporation
- J. E. Hartshorn**, Vice President, Jensen Associates
- Jawad Hashim**, Managing Director, Arab Investment Banking Corporation; former President, Arab Monetary Fund
- Michiya Matsukawa**, Senior Advisor to the President, Nikko Securities; former Special Advisor to the Minister of Finance of Japan
- Christopher McMahon**, Deputy Governor, Bank of England
- Francisco Parra**, Director, International Energy Development Corporation; former Secretary General, OPEC
- I. G. Patel**, Executive Director, Indian Institute of Management; former Governor, Reserve Bank of India
- Robert Pringle**, Executive Director, Group of Thirty
- Robert V. Roosa**, partner, Brown Brothers Harriman; former Under Secretary for Monetary Affairs, U.S. Treasury
- Marina v. N. Whitman**, Vice President and Chief Economist, General Motors Corporation
- Ahmed Zaki Yamani**, Minister of Petroleum and Mineral Resources, Kingdom of Saudi Arabia

Edwin A. Deagle, Jr., Director, International Relations, The Rockefeller Foundation (secretary of the Study Group)

The study group met twice a year or more for each of the past three years, a period of great turbulence in both the oil market and the performance of the world economy. The fact that people of such diverse backgrounds and interests engaged in these sustained discussions is an achievement in itself and proof that it is possible for oil exporting and oil importing countries to explore together their common interests.

This report reflects study group discussions but members have not been asked to sign or endorse its analyses and conclusions. All members have seen the report, but its contents and those of the appendices are in each case the responsibility of the authors.

The first part of the report contains an analysis of the oil market and possibilities for its future; the second presents a discussion of prospects for strengthening the capacity of all participants in the oil market to guard its global heritage. The third part summarizes the conclusions of the study. In addition there are three technical appendices to the report.

Edwin A. Deagle, Jr.
Secretary to the Study Group
March 1983

The Oil Market and the World Economy

Main themes of the report

The international oil market has undergone breathtaking changes in the past decade, continuing up to the very moment. Public policy on the part of both oil exporting and oil importing countries has had great difficulty keeping up with events. Moreover, the pace of market developments within the past year seems to be accelerating, with the result that the future seems fraught with unusually great uncertainty. On the other hand, evidence about what has happened during the past decade in this extraordinary market is accumulating rapidly. Paradoxically, as we learn more about the past, we seem to know less about the future.

This report attempts to cope with that paradox, and suggests the broad outlines of public policies for both oil exporting and oil importing countries. In the analysis which follows, four ideas are developed:

1. **Developments over the past decade have made the international oil market the most important — and unpredictable — market in the world, and therefore a major challenge for public policy.**

The challenge is formidable:

The international oil market is now an extraordinarily important influence on the world economy — and vice versa.

Supply and demand for energy change only very slowly, but imbalances between supply and demand can cause major changes in the demand for oil, with strong effects on oil prices. Oil price changes power-

fully influence the world economy. Major changes in world economic performance, in turn, can create havoc in the oil market.

2. As a result of its global economic importance, the international oil market is now for both oil exporting and oil importing countries profoundly important to their strategic national interests.

Unfortunately, economic forces in the international oil market appear in the short term to reward (or punish) the strategic interests of mainly one party at a time. The unhappy result is that the long-term common interests of both oil exporting and oil importing countries in the proper functioning of the international oil market is overwhelmed by the particular interests of those being punished or rewarded by the market at the moment. As we have seen over the past ten years, these rewards and punishments are massive indeed, and it is small wonder that the global heritage residing in petroleum resources evades the grasp of public policy.

3. Two major controversies cloud effective international action to make the international oil market the proper servant of both buyers and sellers: widespread disagreement about the degree to which the international oil market should be left to market forces or subjected to concerted government action; and great uncertainty about whether, and if so how, oil exporting and oil importing countries might collaborate to protect their common interests.

The first controversy results from conflicting evidence about the present and uncertainty about the future. The second is a child of the past, especially from 1973 to the present.

4. The solution to this puzzle is an array of national strategies which collectively promote stability in the international oil market but permit its basic economic forces to work:

When the international oil market yields major oil price movements, as it did in 1979-80 and in 1982-83, it is in the long-term interest of both the oil exporting and oil importing countries to help stabilize the oil market and prevent the destruction of economic interests of the threatened party by abrupt price fluctuations;

Within this broad strategic premise, both oil exporting and oil importing countries should seek market arrangements which permit economic forces to resolve themselves efficiently and convey to all participants proper price signals;

Concerted international action to achieve these objectives does not require official negotiation. It does require the steady pursuit of elusive long-term national interest in the face of attractive short-term advantage when

one party or the other enjoys market rewards. This is a formidable challenge. But national efforts of individual countries toward this goal would be greatly enhanced if oil exporting and oil importing countries could discuss these matters with one another. The right year to make a start could be 1983.

Oil in World Output and Trade

Since 1973 a powerful relationship has developed between the oil market and the world economy. From 1960 to 1973, the amount of energy of all forms consumed in production in industrialized countries was relatively constant, at about 5 barrels of oil equivalent per \$1,000 of GDP; by 1980 the equivalent figure was 4.4 barrels per \$1,000 (in constant dollars) of GDP — a fall of more than 10 percent. Similarly, the amount of oil required to produce \$1,000 of GDP fell from 2 barrels in 1973 to 1.7 barrels in 1980 — a decline of 15 percent. But this increased economy in the amount of energy required to produce a given amount of final output was then offset by the quadrupling of real oil prices since 1973. Calculated in 1980 dollars, for example, \$1,000 of 1980 GDP required \$52 worth of oil compared with \$15 in 1973. Fuel substitution and conservation have lagged far behind changes in oil prices; and sudden changes in energy prices now have far stronger effects on national economies than was the case in 1973.

Because of its size, the oil market has far-reaching influence on trade relationships and the pattern of international payments imbalance. Measured by the average spot product price, the world oil market in 1980 was worth \$850 billion. If half the market transactions were international (which seems reasonable), the oil market constitutes 80 percent of world fuels trade, which in turn now accounts for 25 percent of world trade, against 9 percent in 1970.¹

World trade, itself, grew in the 1970s much faster than GDP. The 16 percentage-point increase in energy's share of trade considerably exceeds the United States' 1980 share of world trade. Financing the 1970s' increase in international energy trade is equivalent, in other words, to finding the funds to purchase all the exports of another United States. The domestic economic effects of the growth in energy costs as a factor of production thus are powerfully compounded by the balance of payments effects arising from the much more rapid growth of energy payments in world trade.

Sheer size is not the only factor contributing to the international oil

¹ *World Development Report 1981*, The World Bank, August 1981, p. 20.

market's effect on the world economy. Even more important are the consequences of two other characteristics of the energy market: these are, first, that both the supply and demand of energy are extremely price inelastic in the short and medium term; and, second, that the international oil market balances energy supply and demand. A slight mismatch between energy supply and demand thus is greatly magnified in the oil market, with enormous price pressures as a result. In the 1970s, relatively small changes in the availability of OPEC oil supply amidst tight energy market conditions produced two oil price explosions with profound effects on the economies

Table 1

**Changes in Energy and Oil Consumption Relative to GDP
(OECD Countries¹)
(Annual % changes)**

	1960-73	1973-78	1978-81
Energy Consumption per unit of GDP	0.1	-1.6	- 3.2
Oil Consumption per unit of GDP	2.5	-1.9	- 6.8
Gasoline Consumption per Car ²	-0.2	-1.4	- 6.5
Oil Consumption per unit of Consumption Expenditure, Residential/Commercial Sector	2.1	-4.5	- 7.6
Heavy Fuel Oil Consumption per unit of GDP	5.9	-5.9	-10.1

¹ Total OECD energy and oil consumption includes tankers.

² Seven largest OECD economies for which car stock data have been assembled.

Source: *World Energy Outlook*, OECD/IEA, 1982, p. 72.

of the oil importing countries. In the early 1980s, protracted world-wide recession and conservation have dramatically reduced demand for oil, putting downward pressure on its price.

Evidence is gradually accumulating, as Table I shows, that the oil price increases of the 1970s have stimulated the industrialized countries toward energy efficiency generally, toward substitutes for oil particularly, and especially toward substitutes for OPEC oil.

In the United States, for example, real economic growth between the end of 1979 and the end of 1981 was 1.5 percent.² Energy demand for the same period declined by 5.7 percent; oil demand by 12.2 percent and imported oil demand by 32.5 percent.³

What is unclear is how much of the decline in oil demand can be attributed to the cumulative effects of past oil price increases (which induce conservation and fuel substitution) and how much can be attributed to recession and the depressed economic state of energy-intensive industries in the OECD countries. A further uncertainty is the extent to which conservation and fuel substitution induced by past oil price increases are permanent and irreversible, or will be reversed in part by the effects of the recent decline in the real price of oil. A third element of confusion is whether the current trend of increased energy efficiency will continue in the future or soon reach a plateau, with the result that economic growth in the future will be matched by renewed growth in energy demand.

If most of the decline in energy and oil use can be attributed to permanent conservation and fuel substitution, and if the trend continues, the world economy may be less influenced by the international oil market in the 1980s than it was in the 1970s. If, on the other hand, most of the current decline in oil use can be attributed to some combination of reversible conservation and oil substitution (that is, less conservation and extensive fuel switching back to oil as a result of falling real oil prices) and to the temporary recession in energy-intensive industries, then the relationship between the international oil market and the world economy will remain strong and potentially disruptive.

Under these circumstances, a combination of economic recovery in the OECD countries over the next several years and a substantial decline in real oil prices from 1981 to the end of 1985 or so could produce a dramatic increase in oil demand later in the decade. With the oil market tight once again, the stage would be set for another price explosion in the event of a supply disruption. Rapidly rising oil prices, in turn, would produce major economic losses in the world economy, followed by steep decline in demand for oil, and then revenue losses in the oil exporting countries.

Over the long run this kind of volatile commodity market behavior in the international oil market and its powerful effect on the world economy would spell disaster. Each time oil prices fall they destroy the financial estimates which underpin investment decisions for development of more costly new energy supplies. Failure to develop new energy supplies makes

² *OECD Economic Outlook*, #30, December 1981.

³ *Monthly Petroleum Review*, Merrill Lynch, Pierce, Fenner & Smith, Inc., November 1982, pp. 42, 44.

the world much more vulnerable to the economic effects of sudden oil supply disruptions and concomitant oil price explosions, and ultimately raises the spectre of real energy shortages at the end of the century.

As we have noted, the evidence about the determinants of changes in energy and oil demand is not yet conclusive. In the absence of such evidence, it is prudent to act on the supposition that the relationship between the international oil market and the world economy remains capable of unexpectedly punishing either buyers or sellers in the oil market. As we argue later in this report, it is even possible that this relationship may grow more unstable and potentially destructive in the 1990s.

The Strategic Importance of Oil

The geographic concentration of oil, especially in the Middle East, invests it with immense strategic importance to both buyers and sellers, and thereby adds anxiety and uncertainty to the oil market.

For the oil importing countries the strategically important facts are that in the short run there are few substitutes for oil and that a long-lasting interruption of oil supply would cause enormous economic damage. It is hardly surprising, therefore, that when the market is perceived to be "tight," panic buying can quickly set in. In both 1973-74 and 1979-80, the actual level and duration of supply interruption were not severe enough *physically* to damage oil importing country economies; the damage came from the *economic* effects of massive price movements. In both instances, the rapid increase in oil prices reflected — in part — anxiety among oil consumers about security of supply and not just the actual physical availability of supply in the marketplace. When this happens, prices contain a premium reflecting concerns about insecurity of supply not necessarily related to the general scarcity value of oil. Over the medium term, an insecurity premium in the oil price will cause consumers to desert Middle East oil earlier than is economically warranted, penalizing buyers in the short run and sellers in the long run. In the short term each political crisis and the attendant episode of panic buying triggers the sensitive cyclical linkage between the oil market and the world economy.

The strategic importance of oil to many oil exporting countries is doubtless even greater than to oil importers. Most of the oil exporters are developing countries for whom oil, a precious nonrenewable asset, is the central feature of the national patrimony. For these countries the strategic challenge is to exchange the value of oil below the ground for the foundations of diversified, sustainable economies above the ground. For surplus oil exporting countries with small populations relative to the size of

their oil reserves, production of oil at levels higher than needed to finance development — in exchange for overseas financial assets — may not always be in the national interest. Indeed, some of these countries believe that they serve their interests best by limiting production and lengthening the period for which oil revenues will be available. To the extent that this sentiment prevails, it creates inelasticity of oil supply, since higher prices will not necessarily elicit more supply from those countries.

Glut in the oil market in 1981 and 1982 has created a new strategic concern among the oil exporting countries. Most of them have embarked upon development programs that depend on a stable flow of oil revenues. Surplus oil exporting countries such as Saudi Arabia, Kuwait and the United Arab Emirates have some capacity to insulate their economies from major shifts in oil demand. But the other OPEC countries and some non-OPEC oil exporting countries cannot avoid the domestic economic shocks that result from a steep decline in oil revenues such as occurred in 1981 and 1982 (see Tables 2 and 3).

Table 2
Recent Changes in OPEC Oil Production
*(Oil Production in MBD)**

Country	April 1980	April 1982	November 1982
Saudi Arabia	9.765	6.629	5.617
Iran	1.800	1.600	2.600
Iraq	3.500	0.800	0.800
Kuwait	1.555	0.679	0.917
U.A.E.	1.705	1.226	1.157
Qatar	0.500	0.232	0.310
Venezuela	2.050	1.490	2.300
Nigeria	2.190	0.888	1.355
Libya	1.750	0.600	1.700
Indonesia	1.550	1.244	1.400
Algeria	1.000	0.600	0.800
Gabon	0.180	0.150	0.140
Ecuador	0.250	0.200	0.200
Total OPEC	27.795	16.337	19.316

* Excludes natural gas liquids production.

Source: *Monthly Petroleum Review*, Merrill Lynch, February 1983, p. 23.

It is doubtful whether any oil exporting country over time can insulate its economic development from the major swings in the oil price and demand that have occurred in recent years.

The fundamental importance of oil to oil-importers and exporters inevitably makes it extremely difficult for them to work together to fortify their

Table 3
OPEC Current Account Balances
(billions of U.S. dollars)

	1980	1981 ^p	1982 ^e
Exports	304	281	253-255
Imports	133	159	175-183
Trade Balance	171	122	70-80
Net Invisibles	(61)	(57)	(55)
Current Account	110	65	15-25

^p — preliminary

^e — estimate

() — denotes negative

Source: OPEC Secretariat, 1982

common interests in the functioning of the world oil market. Indeed, the volatility of oil prices in recent years makes the risk adjusted cost of either importing or exporting oil higher than its price — a reflection of the new strategic importance to oil in the importing countries.

A recent analysis of the true cost of United States oil imports, for example, concluded that taking into account a broad range of future oil market conditions and possibilities for supply interruptions, the cost to the United States of importing oil is higher than the market price, and therefore it would be advisable to impose an oil import tariff ranging from 43 to 98 percent of the price of imported oil.⁴

One can imagine a comparable analysis for an oil exporting country producing the conclusion that a tariff should be levied by the government on its oil revenues, to capture the social costs involved in exporting oil in a volatile international market. Such protectionist calculations obscure the value of trade, but they indicate the cost to both oil importing and oil exporting countries of price shocks in the oil market. This is the heart of what is jointly at interest for both parties. Unfortunately, major price movements in the international oil market — especially if sudden and unexpected — punish only one party at a time and reward the other. Thus it

⁴ *Oil Gluts and Oil Tariffs*, William W. Hogan, Harvard Energy Security Program Discussion Paper, May 1982.

becomes very difficult for both parties to agree on the value of working together to protect their common interest in market stability, as the dismal diplomatic record of the past decade attests.

Influence and Control in the Oil Market

In public discussion, OPEC tended to be viewed in the 1970's as an invincible monopoly or cartel; now there is a tendency to claim that this power has been weakened, if not broken. In fact OPEC market power in the past has been somewhat overestimated, as its present market power may be underestimated. The basic source of OPEC influence in the oil market rests in the geologic fact that, for the foreseeable future, oil in the Gulf region of the Middle East will remain the lowest cost source of energy in the world, and its price can be adjusted to meet almost any conceivable market conditions. On the other hand, economic forces in the oil market are, as we have noted, indeed powerful over time. Price maintenance under conditions of weak demand requires production ceilings very difficult to coordinate. Contemporary power relations in the oil market therefore are complex and tend to oscillate cyclically, and are exercised very differently than by the "Seven Sisters" in their heyday.

OPEC countries obviously have been successful in getting control of their oil extraction industries; in shifting the oil pricing system away from cost of production toward economic rent based on scarcity; in capturing a large portion of that rent for themselves; and in managing to insure that sufficient oil flows despite disruptions in particular member countries. However, contrary to a widespread public impression, OPEC has never simply raised oil prices through the unilateral application of market power. In both 1973-74 and 1979-80 political crises triggered a temporary interruption of oil supply — one deliberate, the other unintended — which was followed by panic buying in the spot oil market. OPEC countries thereafter adjusted official prices and added premiums and surcharges to capture the market realities expressed in spot prices. OPEC market power has been most effective in preventing oil prices from tumbling in slack markets. But that power too has been limited; OPEC was unable to adopt policies to prevent a 10 percent decline in the real price of oil from 1975-78, and a 25 percent decline since 1981.⁵

Not the strength of OPEC, but rather the collective weakness of the industrialized oil importing countries has until recently been the most important fact about oil market power. These countries have not yet developed the capacity to adjust their aggregate demand for oil to the state

⁵ In dollars only; the price of oil in Europe and Japan rose in much of 1981 and 1982 because of exchange rate changes. See Appendix 1.

of the market, even in emergencies, or to cope with the economic problems that in part result from, and at the same time contribute to, the instability of the oil market. The United States has only recently begun to install national policies — mainly in the form of price decontrol — which will contribute to demand restraint. Collectively the industrialized oil importing countries have developed only relatively weak emergency arrangements for coordinated stock management, and these are oriented toward minimizing supply disruption rather than influencing the behavior of prices.

Moreover, structural changes in the oil industry may contribute to oil market instability in the future in ways that will make new policy demands on the industrialized oil importing countries. In the 1950s and 1960s the international oil companies coordinated a fully integrated system from wellhead to consumer. Now the international oil companies are less involved in crude oil production and product retailing, and more involved in trading. Partly as a result, spot and futures markets have joined (at the margin) inventories as hedges against oil market movements. If industry stock levels become less important for seasonal and cyclical fluctuations and thus are reduced, the oil industry may be less able to cope with supply disruptions. Government strategic stocks, sharing arrangements and surge production capacity would become more important than today.

The collective ability of the oil importing countries to act as stabilizing forces in the oil market, given its potential volatility, remains very much in doubt. Moreover, there is little evidence that individually or collectively the industrialized countries recognize their strategic interests in ensuring that oil prices do not fall too far, too quickly. In short, it is highly questionable whether current oil market policies in the West are adequate for the 1980s.

Some maintain that the oil market is finally becoming competitive and should therefore be left alone, so far as politically possible, while others believe that the oil market is inherently unstable, is too important to be left to market forces, and must be conditioned by government policies. This debate is explored further in Part III of this report. In the meantime, it is worthwhile exploring what the future might hold for this extraordinary market.

Supply and Demand through 1990

Predicting the oil market, even in the short term, is a hazardous business; most forecasts made in the past ten years have been very much in error.⁶ Nonetheless it can be useful to estimate the range of possibilities and ana-

⁶ See *Energy in the 1980s: An Analysis of Recent Studies*, Group of Thirty, 1980, and "Oil Demand and Energy Markets: An Interpretation of Forecasts for the 1980s", Edwin A. Deagle, Jr. and Bijan Mossavar-Rahmani, *OPEC Review*, Fall, 1982.

lyze what combinations of circumstances are likely to produce one outcome versus another. In the case of non-oil energy markets, many trends in supply and demand are now becoming clearer. In the near future most new supplies will come from coal, natural gas and from nuclear power stations already under construction, as a recent estimate in Table 4 indicates.⁷

The outlook for the remainder of the decade is quite uncertain. The major imponderables are three: demand for OPEC oil, particularly from the OECD countries; supply of OPEC oil, particularly from the Gulf; and changes in oil inventory (stock) levels. Because the relationship between oil inventories and the balance between supply and demand recently has been unusually important and is not well understood, it is useful to examine the role of oil stocks since 1978.

Table 4

**Projected Non-Communist
World Primary Energy Consumption**
(million barrels per day of oil equivalent)

	1980		1990		2000	
	MBDOE	(%)	MBDOE	(%)	MBDOE	(%)
Oil	49	(50.6)	53	(43.4)	54	(34.6)
Natural Gas	18	(19.2)	23	(18.9)	26	(16.7)
Coal	20	(20.8)	22	(18.0)	40	(25.6)
Hydropower	7	(7.3)	8	(6.6)	10	(6.4)
Nuclear	3	(3.1)	11	(9.0)	15	(9.6)
Synthetics	—	—	3	(2.5)	7	(4.5)
Renewables	—	—	2	(1.6)	4	(2.6)
Total	97	(100.0)	122	(100.0)	156	(100.0)

Source: 1980 figures adapted from British Petroleum (1981), 1990 and 2000 figures adapted from Exxon(1981), by Bijan Mossavar-Rahmani.

The Role of Stocks

The world oil industry at the end of 1980 maintained about 10 billion barrels of oil inventory worth well over \$300 billion in the complete supply chain from wellhead to consumer-about six month's supply.⁸ Only about

⁷ Appendix 2 contains a discussion of non-oil supply prospects between now and the year 2000.

⁸ *World Oil Inventories*, Exxon Corporation, August 1981.

half this amount, 5.0-5.5 billion barrels of primary inventory, is within reach of industry or government control, and only three-quarters of that is monitored through data routinely obtained through government reporting systems in the United States, Western Europe and Japan. Rough estimates must be made of all the rest, and as a result all stock estimates have a built-in margin of error. Most of the 5 billion barrels of primary inventory is not easily available in the event of a supply emergency, since part of it is required to keep the pipelines and storage facilities of the supply system operational. Exxon estimates that in 1980-81 the oil industry maintained between 1.0 and 1.5 billion barrels (varying by season) of commercially usable stocks — that is, stocks which can be drawn down without damage to the distribution system. This was about 500 million barrels above the normal pattern of the 1970s (and worth \$17 billion).

Seasonal variation in demand between winter peak and summer floor can be as much as 5 to 6 MBD, and the oil industry uses its stocks to smooth out these seasonal variations. The oil industry routinely destocks in the winter and restocks in the summer at the rate of 2 to 3 MBD, changing its inventories seasonally by as much as 500 million barrels.

At the time of the Iranian revolution, free world commercial oil stocks were at slightly below normal levels — about 80 days of supply at the end of 1978.⁹ The drop in Iranian supplies prompted companies to deplete stocks in the first quarter of 1979 by more than 500 million barrels, severely diminishing usable commercial stocks. Thereafter the oil industry began to accumulate and maintain higher stocks, and by the third quarter of 1980 stock levels were about 500 million barrels above normal. Availability and use of these excess stocks at the rate of about 3 MBD during the winter of 1980-81 seems to have contributed to the relative stability of the market in the face of disruption from the war in Iran and Iraq in 1981. For more detail see Appendix 3.

Until recently, high interest rates have made this form of market stability expensive — about \$8-9 per barrel per year, or \$4.0-4.5 billion per year for 500 million extra barrels.¹⁰ Unless oil prices were expected to rise by at least 25 percent per year, holding excess oil stocks was a costly proposition. There is, indeed, growing evidence that high interest costs and expectation of a soft market for several years have prompted an unexpected inventory liquidation to below normal levels, as displayed in Table 5.

In the summer and early fall of 1981, instead of rebuilding stocks at the

⁹ Figures from *Monthly Petroleum Review*, Merrill Lynch, Pierce, Fenner & Smith, Inc., February 1983, p. 19. Different institutions maintain inventory estimates for different groupings of countries. Exxon maintains figures for the whole world. Merrill Lynch estimates for the free world are typically about 300-500 million barrels lower.

¹⁰ *World Oil Inventories*, op. cit., p. 14.

rate of about 2.0 MBD, industry was destocking at the rate of about 1.5 MBD, thus lowering the apparent demand for OPEC oil by about 3.5 MBD. Combined with the effects of increased conservation and depressed economic activity in the industrialized countries (especially in Western Europe), the unusual summer and fall destocking lowered apparent demand for OPEC oil in the third quarter of 1981 to about 21.6 MBD and in the fourth quarter to 22.0 MBD. Over the year, stocks may have been reduced overall by about 170 million barrels.¹¹

In 1982 destocking was even heavier, especially in the first quarter when stocks were drawn at the rate of about 3.3 MBD. By the end of 1982 stocks were estimated to have been reduced by 450 million barrels or more. And, according to first quarter estimates for 1983, stocks fell by another 378 million barrels to 4.3 billion barrels. Since 1980 stocks may have fallen by nearly a billion barrels, wiping out most of the excess inventory accumulated in 1979 and early 1980. Thus at the end of the first quarter, 1983, demand, supply and inventory supplies appear to be unexpectedly low. (See table 5) What might then ensue between 1983 and 1990?

A Pick-up in Demand?

On the demand side the determining issues are likely to be two: the timing and extent of economic recovery in the industrialized countries, and the extent to which economic growth is matched by growth in energy and oil demand.

A substantial fall in real oil prices (say, to \$20 per barrel) would benefit importing countries and spur economic recovery — and thus demand for oil later in the decade — but would also carry new risk and dangers. These would be of three kinds:

First, oil exporting countries, including not only OPEC countries but also Mexico and other oil exporting countries, would suffer powerful shifts in terms of trade — the international purchasing power of their oil exports would decline.

Second, the “forced savings” effect of OPEC country surpluses would disappear, possibly making it more difficult for the international monetary system to finance current account imbalances of oil importing or exporting countries. This means that these countries must absorb more of the burden themselves, through domestic economic austerity strategies. Both of these factors could add further to the strains on the international financial system, at least in the short run.

Third, falling real oil prices would cause investment in alternative energy sources to decline. Most high cost energy supply projects have been recently postponed or cancelled, presumably in response to changed expectations about the future of oil prices. If this trend continues, changes in the balance of energy supply and demand will have to be reconciled to an

¹¹ *Monthly Petroleum Review*, Merrill Lynch, Pierce, Fenner & Smith Inc., November 1982, p. 19.

Table 5
Free World Oil Supply/Demand Balance, 1977-83
(Million Barrels Per Day — MBD)

	1977	1978	1979	1980	1981	1Q	2Q	3Q	4Q	YR	1983E 1Q
<i>Demand (MBD)</i>											
U.S.	18.5	18.8	18.4	17.1	16.0	15.8	15.3	14.8	14.8	15.2	15.1
Foreign	31.5	32.6	33.7	32.4	31.1	31.5	28.9	28.6	30.0	29.8	29.8
Total	50.0	51.4	52.1	49.5	47.1	47.3	44.2	43.4	44.8	44.9	44.9
<i>Supply (MBD)</i>											
OPEC	31.8	30.3	31.4	27.4	23.2	20.1	18.1	18.9	20.0	19.3	15.7
Non-OPEC	18.3	20.8	22.1	22.3	23.3	23.9	24.3	24.5	25.0	24.4	24.9
Total	50.1	51.1	53.5	49.7	46.5	44.0	42.4	43.4	45.0	43.7	40.6
Inventory Gain* (MBD)	0.1	(0.3)	1.3	0.2	(0.6)	(3.3)	(1.8)	(0.0)	(0.2)	(1.2)	(4.3)
<i>Inventory Levels*</i>											
(Million barrels)											
Begin	4,690	4,728	4,537	5,062	5,290	5,125	4,828	4,665	4,665	5,125	4,683
Change	38	(191)	525	228	(165)	(297)	(164)	(0)	18	(442)	(378)
End	4,728	4,537	5,062	5,290	5,125	4,828	4,665	4,665	4,683	4,683	4,305

Source: *Monthly Petroleum Review*, Merrill Lynch, Pierce, Fenner & Smith, Inc., February 1983, pp. 18-19. Corrected.

* Inventory figures are derived arithmetically from differences between supply and demand and therefore convey the impression of much more precision than is warranted by measurement/estimation systems. In addition, OPEC secretariat figures for inventory change are likely to show steeper inventory drawdown in 1982. The OPEC projections for 1982 inventory changes otherwise show a decline in OECD stocks of from 588-666 million barrels.

even greater extent than anticipated in the oil market itself. Moreover, weak oil prices could ultimately affect the exploration and development of oil resources both within and outside OPEC countries. Thus falling real oil prices over time could simultaneously stimulate demand for oil and truncate the development of new oil resources.

In such circumstances, much will depend on the oil inventory policies of the oil industry and interested governments. If structural changes in the oil industry continue to reduce the perceived need for industrial stocks, and if at the same time oil exporting countries devote less resources toward maintenance of excess production capacity, then the pressures on the market and the potential volatility of oil prices will increase dramatically.

Thus developments between now and 1985 could give rise to unexpected increases in oil demand in the latter part of the decade, and very sharp increases in the demand for OPEC oil. For reasons we point out in the next section of the report, most of these shifts in demand would fall on the Gulf oil exporting countries.

On the other hand, it is still possible that oil demand through the decade will be stable, that is, rising gently and predictably or remaining relatively flat. Real oil prices would stay roughly the same through 1985 and rise a bit through the rest of the decade. Expectation of a firm real oil price rise would restore some investment in new energy resources, including new Gulf surplus production capacity and industrialized country strategic reserves, if needed. Oil importing developing country programs to enlarge their domestic energy supplies and enhance conservation might be given new impetus.

In early 1983 it is very difficult to know which of these two visions — or others — might become history by 1990 or thereafter. But the difference clearly matters to those who make public policy.

The Oil Market in the Medium and Long-Term

If short-term forecasting is hazardous, medium and long term forecasting is surely foolhardy. A report prepared for the Group of Thirty summarizing and assessing some 100 studies and projections of future energy supply and demand prepared over the past 10 years, found that these studies present an astonishing range of future possibilities. For example, the mean of estimates of 1985 world demand for OPEC oil in studies prepared in the 1974-75 period was 38.5 MBD; for studies prepared in 1977-78, 41.0 MBD; and for studies prepared in 1979-80, 34.3 MBD.¹² Since the oil glut began in 1981, some analysts have suggested that demand for OPEC oil in 1990 may be no more than 15 MBD and could be as low as zero!

No explicit forecast for 1990 and beyond is therefore attempted here.

¹² *Energy in the 1980s: An Analysis of Recent Studies*, *op. cit.*, p. 15.

Instead two key factors that will shape the energy markets of the future are presented for analysis.

The most important determinant of future energy markets may be the implicit race between fuel substitution and conservation in the industrialized oil importing countries and the growth in net petroleum demand in the developing countries, especially the oil-exporting developing countries themselves. Good or poor performance by one side or the other will drastically alter the oil supply/demand balance OPEC countries would face in the market. Table 6, containing three different estimates of 1990 free world oil demand, estimates of non-OPEC production, and implied levels of required OPEC production, hints at the range of estimated possibilities.

However, these are all point estimates — snapshots of 1990 energy futures derived from relatively crude arithmetic. Revolutions, wars, new inventions and other energy surprises undoubtedly will mark the difficult passage between the present and the uncertain future of the 1990s. One point seems certain: if the combination of circumstances which take place between now and 1990 yields a third price explosion, the race between OECD oil conservation and rising developing country oil demand will be overshadowed — catastrophically, for all — by profound economic loss. Less dramatic, but disastrous nonetheless, is the possibility that continued recession, misguided policies in the industrialized countries, and OPEC inability to manage production could result in a continuing short-term decline in the real price of oil, postponing the availability of new and more

Table 6
1990 Free World Oil Balance Estimates
(Million barrels per day)

	CONOCO	EXXON	IEA/OECD ^b
<i>Demand</i>			
Industrialized Countries	40.0 ^a	36.0	35.5
Developing Countries	11.7 ^a	17.0	17.5
Total	51.7	53.0	53.0
<i>Supply Requirement</i>			
Non-OPEC Production	28.7	25.0	23.0
OPEC supply required to balance	23.0	28.0	30.0

Source: Exxon, March 1982; Conoco, January 1982.

^a Estimated from graphs, charts and other data in studies cited.

^b IEA/OECD, October 1982. (Figures are averages of two scenarios).

expensive energy supplies and sowing the seeds of political and economic disruption among the oil exporting countries.

The Key Role of the Gulf Countries

The second major influence on the future oil market could be the further concentration of effective market power in the countries of the Gulf, and the way they will use that power. In the course of this decade OPEC is likely to undergo important shifts in the relative market power of its members. By 1990 four OPEC members — Algeria, Ecuador, Gabon and Qatar — may each have the capacity to export about 0.5 MBD or less. Indonesia, Libya, Nigeria and Venezuela could export more than this but may have little elbow room to adjust production to market circumstances. The remaining five oil exporting members of OPEC would consist (with the notable exceptions of Iran and Iraq) of countries with low populations and substantial oil or financial reserves. Assuming the war between Iraq and Iran ends, these five Gulf countries by 1990 are likely to share among themselves the power to adjust OPEC oil exports by more than 10 MBD, as Table 7 indicates. Other countries outside of OPEC — Mexico, Norway, perhaps even Egypt and China — may become more significant oil exporters. None of them, however, are likely to be able to adjust production as easily in response to market conditions as can the key five countries in the Gulf, and first among them, Saudi Arabia.

Whether or not these Gulf countries will use their continuing power to stabilize the oil market will depend on a number of factors. Clearly one of the most important is the behavior of oil prices. Another is the value of financial and real assets these countries receive in exchange for exporting oil at levels above the level required to finance their development needs; more will be said about this later.

In any case it is evident that the decline in OPEC's share of world energy (and oil) production over the next two decades is misleading insofar as it is thought to affect market power. The power to balance the oil market — and thus all energy markets — may be more concentrated in the 1990s rather than less. It will gravitate to those countries which can afford to adjust production significantly enough to shift market conditions.

While the Gulf countries may dominate OPEC exports, these exports are likely to represent a somewhat smaller share of free world oil trade (35 percent as compared to 53 percent at present); and that oil trade, in turn, is likely to represent a much smaller proportion of supply in world energy markets.¹³ This implies that to exercise their potential power the Gulf coun-

¹³ *World Development Report 1981*, IBRD, p. 39. For example, the World Bank estimates that of new energy supplies in the 1960s, 62 percent was new oil production; during the

tries must be able to adjust production to meet a much broader range of oil demand levels than has been in the case in recent years.

To put the issue another way: unless the Gulf countries are prepared to absorb most of the swings in oil demand, the market's inherent instability would be further exacerbated, especially if the oil industry relies less in the future on excess stocks on balance market pressures than it has in the past.

To summarize, the world may face by the last years of the century the paradox in which the oil exporting countries in the Gulf become slightly *less* important as contributors to global energy supply, and much *more* important as potentially stabilizing or destabilizing influences. It is likely to become progressively more difficult for these countries to adjust production sufficiently to influence oil prices, making for potentially greater market volatility

Table 7

OPEC 1990 Production Range Estimates

(Million barrels per day)

	Low	High
Saudi Arabia	5.0	11.0
Iran	3.5	5.0
Iraq	2.0	3.5
Kuwait	0.8	2.5
UAE	1.3	2.0
Total	12.6	24.0

Source: Estimates by author and Bijan Mossavar-Rahmani.

in the 1990s. Managing the matching of their oil production to wide swings in oil demand may require the provision of substantial — and relatively liquid — financial assets to tide them over in periods of weak oil demand.

General Conclusions

Mindful of the fact that forecasting the future of energy markets is hazardous, several general conclusions can be drawn from the analysis thus far:

Oil, because it is so critical to the world economy and is relatively cheap to extract, will remain the premium residual energy source (and therefore its

1970s, oil accounted for 41 percent of new energy supplies; the 1980s estimate is 25 percent; the 1990s, 5 percent.

market the energy price setter) well into the next century. But in areas other than the Gulf region of the Middle East, oil is becoming more difficult to find and extract and therefore more expensive. Accordingly, the oil exporting countries of the Gulf are in the energy market to stay, at least for the rest of the century.

Oil importing industrialized countries have much to do to improve their collective performance in contributing to stability in the oil market.

Because of some inherent characteristics of the market, price movements are likely to continue to exhibit strong fluctuations. Instability could be worsened not only by new shocks but also by shifts in market power.

The market will retain the potential to damage the interests of both oil exporting and oil importing countries.

It is therefore in the interest of all parties to improve the economic functioning of the oil market and see to its stability.

But how is this to be done?

Compatible Policies Among Oil Exporting and Oil Importing Countries

This part of the report examines the debate between *laissez faire* and *dirigiste* theories about the oil market and then sets forth suggestions about specific policies, mechanisms and institutional arrangements for improving the oil market and its relationships with the world economy.

The Case for Joint Efforts to Improve the Oil Market

It is not at all obvious that the public interest is served by attempting to improve the structure and operations of the international oil market. Indeed, it is often argued that government intervention and price and production management by the international oil companies prior to 1973 are the principal reasons why the oil market has performed badly and made the energy transition so painful. Price management, from this view, is almost sure to fail: the oil companies priced oil too low in the 1960s and OPEC priced it too high in the 1970s. Who knows how it should be priced in the 1980s? If the oil market is volatile, that is the price to pay to ensure that it conveys the correct economic signals and helps the world navigate the energy transition efficiently. Decontrol, in this view, is not only the best policy; it is the only policy in light of how little is really known about the energy future.

On the surface this is a powerful set of arguments. If one could be assured that the oil market functioned reasonably well, a free market policy would clearly be superior. But the fact is that with the exception of the spot and futures crude oil and refined product markets, the oil market has always had relatively few of the attributes of a competitive market. Moreover, as outlined earlier, the oil market's short-term behavior driving not only from the susceptibility to shocks of various kinds but also to certain structural features of the market, severely constrains its long-term economic function as the price setter in world energy markets. In terms of economic efficiency oil prices are more sensitive, at least in the short run, to security of supply concerns and world economic performance than to the price of energy substitutes. Moreover, the cyclical volatility of oil prices and buyer/seller power relationships prompt little confidence that oil prices over time will properly signal the long-run availability (or scarcity) of oil.

Higher oil prices only gradually promoted increased supply of alternative sources of energy. In part this is because the capital investment required to shift world reliance on energy away from oil is enormous and the process takes time. But it may also be true that the behavior of real oil prices — particularly their sharp increase in 1979-80 and decline in 1975-78 and

1981-83 — has failed to convey the correct economic signals about the long-term value of oil relative to its substitutes.

Cyclical volatility in the oil market inflicts severe economic blows successively on buyers and sellers and increases the stakes for each side in gaining advantage following a reversal in the market. Thus volatility breeds further instability, a strong tendency to blame one's misfortune on the other side, and great uncertainty about future profitability. Certainly investment in alternative energy supply has lagged badly.

A substantial portion of new energy supplies will come from the Arab OPEC countries. A recent study — admittedly tentative — of required investment to enable the Arab petroleum industry to sustain oil output equivalent to its 1977-80 average of about 22 MBD and maintain its current reserves-to-production ratio concludes that \$331 billion will be required between now and the year 2000.¹ Of this total, \$240 billion would be needed for new exploration and development, \$11 billion for enhanced recovery and \$80 billion to develop gas reserves. In addition, the study estimates that \$159 billion would be required if refineries planned or under construction are to be completed on schedule.

Investments of this magnitude, like those for new energy supplies in the oil importing countries, will not be made if investors cannot foresee profitability because of great price uncertainty in energy markets. In particular, these investments will not take place if real oil prices decline substantially in the short-term, because investors in the industrialized countries will be unwilling to make them, and governments in the oil exporting countries will be unable to afford them.

If there is justification for intervention in the market, it is to improve the prospects that such investments will be made. For the oil *importing* countries — both industrialized and developing — less volatile oil market conditions would also permit diversification of oil supplies and adjustments to higher energy prices without excessive economic losses. The oil *exporting* countries would face more predictable export revenues and current account positions.

The surplus oil exporting countries would benefit from enhanced economic performance of their real financial assets in the oil importing countries, and from a gradual lowering of strategic concerns in the West about security of supply. Lowering the political and military temperature in the Middle East would certainly be attractive to most countries, especially the Gulf oil exporting countries.

Improving the economic functioning of the oil market and reducing its price volatility may in fact be both a reason for, and a goal of, better public

¹ Summarized in *Petroleum Intelligence Weekly*, April 19, 1982, p. 8.

policy for the market, as is argued here. But how is it to be done? Answers to this question are suggested in the next two sections of the report.

Improving the Economic Functioning of the Oil Market: The Real Side

Until very recently, the major structural problems in the oil market were seen to be ones that produced consistent upward pressure in oil prices and great vulnerability to price explosions when the market became tight and a political crisis occurred. The best solution to such unruly market conditions was thought by many to be a scheme of price setting arrangements, which would not produce free market conditions but might stabilize prices.

The case for oil price fixing rests on the proposition that the oil market is unlikely to acquire the characteristics of a competitive market, for the reasons outlined earlier. Therefore, the argument goes, reasonable stability is of first importance, and if price fixing deprives the market of its ability to send accurate economic signals as a result, so be it; the trade-off is a reasonable one.

But recent events indicate that the oil market may be acquiring some of the functional capabilities of an economically competitive market. The evidence, as pointed out earlier, is unclear. But if the opportunity exists, the basic strategy ought to be to improve the economic functioning of the oil market, rather than to lock up its price structure.

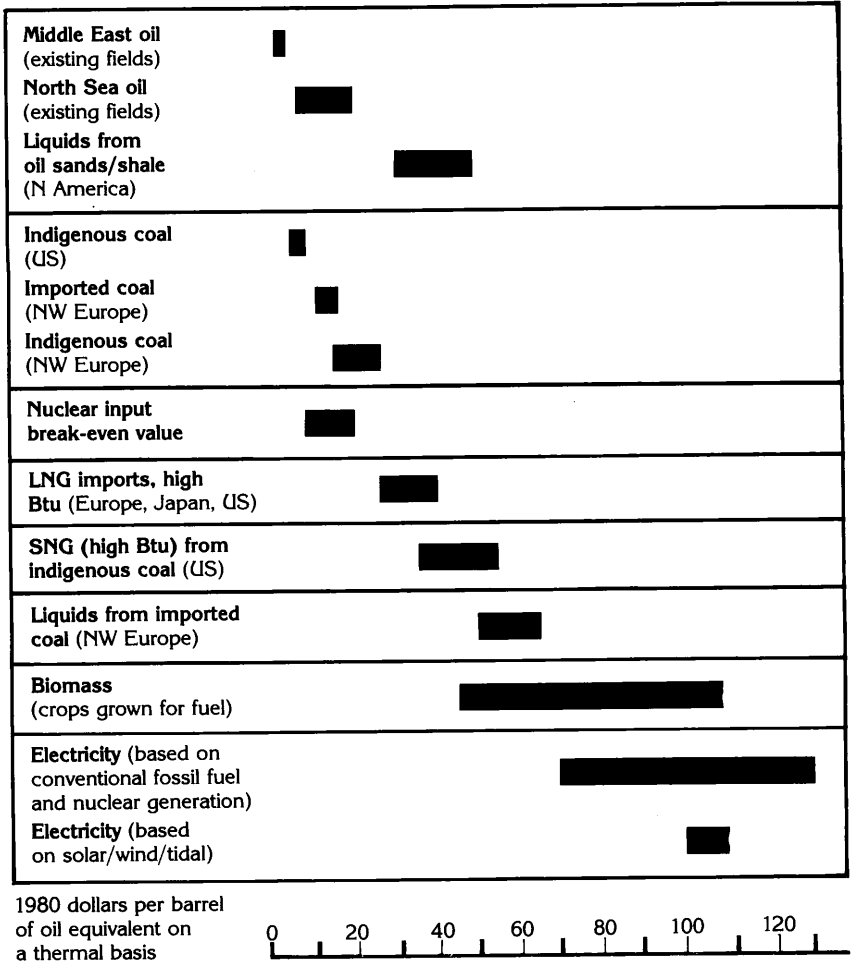
Price controls should be seen only as a standby solution, since such controls cripple the economic signaling and market clearing functions of prices. If prices are set too low, the world would use too much oil too quickly, before alternatives to it were available in quantity. Serious shortages could then result with fewer options to deal with them than today. On the other hand, if the price is set too high, the world would suffer unnecessary economic losses and would invest in energy supplies more expensive than true economic conditions warranted. Eventually the price control regime would collapse.

The keys to better oil market economic performance are twofold: (1) strengthening the relationship between short-term oil price movements and the long-term scarcity of oil, and (2) improving the ability of the oil market to absorb shocks in supply and demand. The two elements are related.

Improving Market Signals

We start from the proposition that if short-term supply and demand price inelasticity produces oil price swings between, say, \$15 and \$75 per barrel, investment will be unnecessarily held back by such extreme volatility and the expectation that it could continue. At present, it appears that in the

Figure 1
Estimates of Comparative Energy Costs¹
 ■ Estimated range



¹ Thermal equivalence is not the only basis for comparing different energy sources. Efficiency losses in the systems used to translate thermal energy to usable work affect the end-use costs of alternate energy sources.

Source: Royal Dutch/Shell Group, *The Energy Spectrum*, Shell Briefing Service Number Three, 1982, p. 3.

future the real price of oil should rise gradually, to make commercially feasible the production of other more costly sources of energy. Figure 1 indicates the basis for this judgment. But to the important point in that we do not need to claim to know what the "right" real price is or will be, in order to make the case for greater stability.

The first difficulty is that it is in the short-term economic interest of the oil importing countries that real oil prices continue to decline. Falling oil prices reduce inflation, improve the balance of payments current account and stimulate recovery from recession.² But this short-term interest conflicts with the long-term economic interest in effecting a smooth transition from the present energy regime which still reflects the historic reliance on low-cost energy sources, to a future one likely to be based on higher costs. The short-term interest in falling oil prices also conflicts with the political interest in ensuring that oil exporting countries, especially those in the Gulf region, enjoy the political and economic stability which flows from stable oil revenues.

For the oil exporting countries the conflict between short-term and long-term interests occurs when oil prices rise rapidly, as in 1979-80. The short-term financial gain obscures these countries' long-term strategic interests in the economic and political health of the Western industrialized countries and in insuring a continuing market for oil.

These conflicts in interest make it difficult for either side to act in pursuit of long-term interests when opposing short-term interest is rewarded by the market at the moment. Moreover, as argued above, the structure of the oil market is such, and the forces within it are strong enough to prevent either oil exporting or oil importing countries from stabilizing the market by themselves. Both parties must act, by taking steps which strengthen long-term interests, do not penalize short-term interests, and improve the resilience of the market.

When real oil prices are declining because of falling demand nothing can substitute for the ability of the OPEC countries to coordinate a curtailment of production. Because so much of the value of Middle East oil is economic rent, the danger in a soft oil market is downward price competition unbuffered by the cost of production.

Better Stockpile Management

However, oil importing countries also should play a constructive role. True, they do not have a short-term interest in helping the OPEC countries defend their oil price structure, but they do have an interest in ensuring that

² Assuming that the financial problems of heavily indebted oil-exporting developing countries can be managed without impairing further the stability of the international banking system.

oil stockpile management is economically sound. This means, among other things, acquiring more crude oil and product stocks when the market is soft and releasing them when the market is tight. Both actions help OPEC countries moderate severe oil price movements and are in the long-term *and* short-term interests of the industrialized oil importing countries.

The oil market will be capable of resisting price explosions if it is resilient enough to absorb unexpected supply disruptions. Since oil demand fell in 1981-83 OPEC countries now have spare production capacity of more than 10 MBD. This in itself is a powerful buffer in the current oil market, but it is not the result of explicit policies and could change quickly. In this case there is no substitute for proper stock management policies on the part of the industrialized oil importing countries.

Although the world now maintains a controllable inventory of oil (and its products) of between 1.0 and 1.5 billion barrels, the record since 1973 of stock management as a buffering influence in the oil market has been for the most part dismal. Stock drawdowns in 1975-78 and in 1981-82 exacerbated the decline in real oil prices, and stock buildup in 1979 and mid-1980 contributed to the explosive price increases.

In the oil market, politics and economics tend to work perversely with respect to stockpile management. Governments find it difficult to maintain domestic support for acquisition of strategic stockpiles, especially when the oil market is slack — though that is when stocks should be acquired — since there is unlikely to be a public sense of urgency. On the other hand, when a crisis disrupts some portion of supply in a tight market, governments — not knowing how long the crisis will last or whether it will get worse — tend to increase stocks rather than draw them down.

When interest rates are high, industry stock management behavior in the oil market tends to be perverse as well. In a tight oil market, expectations of big future price increases make increased stocks prudent and financially feasible, despite high interest rates. Thus it made good business sense for the industry to increase stocks in the fall of 1980 after the war between Iraq and Iran began, even though spot prices were rising. Similarly, it made no sense to retain excess stocks in 1981 and 1982 when real oil prices were falling, interest rates were high and the annual cost of carrying the stocks was 25 percent of the oil price. In both instances government and industry stock management behavior exacerbated swings in the oil market.

The OECD/IEA International Emergency Program (IEP), which calls for sharing of oil stocks and surpluses among IEA countries in the event of an emergency disruptions, does not deal satisfactorily with buffer stock issues. Aside from questions about whether the Program would work in practice, its trigger (7 percent supply loss) is set too high to enable the

sharing scheme to operate as a price buffer in a tight but otherwise normal market. Moreover, the Program has no provision for price support in a slack market.

Four improvements in oil stock management policies would contribute to market efficiency and stability:

First, the OECD countries should establish stock management policies which will permit the coordinated acquisition, maintenance, and proper use of strategic stocks, adequate to cope with a substantial emergency disruption of oil supply. One necessary element of this strategy is a clear separation between industry stocks and government financed and owned strategic stocks.

Second, OECD governments should adopt policies which provide incentives for their oil companies to acquire extra commercial stocks when the oil market is soft and release them when the market is tight. One such incentive is a guarantee by government that industry stocks will not be confiscated in circumstances short of a dire emergency.

Third, in the early stages of a supply emergency — when it is not clear whether or not the interruption is temporary — OECD governments should allow industry to reduce mandatory commercial stocks somewhat (say, 85 days rather than 90), allowing stock trading and to reduce pressures on the spot market.

Fourth, OECD governments should design contingency policies and procedures for making decisions to enter a stressed oil market by selling strategic oil stocks. Only a few governments have thought through the puzzle of how, whether and when strategic oil stocks should be used for price stability in an emergency.

A more general proposition is that demand and stockpile management should be structured so that they are compatible with market conditions (which is in the interest of both oil importing and oil exporting countries). OECD countries should discuss with OPEC countries stock and demand management policies and surplus production capacity policies, to build confidence in the ability of the two sides to enhance their common interests. Unfortunately there does not exist an obvious institutional channel of communication, and the IEA is an unlikely candidate.

The IEA and its emergency programs were established in 1974 in an atmosphere of fear about the “oil weapon” and so have been seen as an instrument of confrontation with OPEC. It is partly for this reason that France is not a member of the IEA. It is possible that the OECD Oil Committee and the OPEC Long-Term Strategy Committee might provide a useful institutional channel for consultation.

Improving the Economic Functioning of the Oil Market: The Financial Side

There are two related but conceptually different issues involved in improving the economic performance of the oil market from the financial side:

Enabling economic adjustment by the oil importing developing countries to take place efficiently without placing excessive strains on their economies and on the international monetary system;

Removing barriers to investment of surplus oil revenues so that surplus oil producing countries retain an economic incentive to produce oil when demand is strong and can efficiently acquire assets which will enable them to curtail oil production when oil demand is weak.

A full discussion of the first issue is beyond the scope of this report. In brief, though, a principal concern is to ensure that the oil importing developing countries are permitted opportunities to devise appropriate mixtures of adjustment policies and financing which permit a politically bearable transition to sustainable economic positions, given changes in energy and other import prices, and slower growth in export markets. A key issue is concessionary lending requirements, and here it is important to categorize oil importing countries' problems carefully.

One group, though not members of OPEC, can expect to be oil exporting countries and therefore are not critically in need of concessionary financing for energy purposes. A number of countries have joined, or are expected to join, the ranks of this group: Angola, Bahrain, Bolivia, Brunei, Burma, Congo, Egypt, Mexico, Malaysia, Oman, Peru, Syria, Trinidad and Tobago, Tunisia, and Zaire. These countries have opportunities for development strategies based on oil exports totaling in 1978 1.74 MBD — opportunities not available to the other 80 or so oil importing developing countries.

But this group of 80 countries, too, needs categorization. Nine of the 80 countries import more than 100,000 barrels per day, and at 3.17 MBD in 1978, accounted for 77 percent of the total net imports of all oil importing developing countries: Brazil, South Korea, Turkey, Taiwan, India, the Philippines, Thailand, Cuba, and Singapore, in descending order of imports. But of this group, India in 1979 had a per capita income of \$190 and the Philippines \$600; the other seven had per capita incomes above \$1,000.³

Among the other 71 countries, oil imports totaled 920,000 barrels per day in 1978. But their economic fortunes varied widely, from Bangladesh, importing 36,000 barrels per day in 1978 and with a per capita income of \$90, to Argentina, importing only 25,000 barrels per day in 1978 but with a

³ *World Development Report, 1981, op. cit.*, pp. 134-135.

per capita income of \$1,910. In 1978, Argentina imported less than one quarter of India's oil imports, but its per capita income was more than 10 times that of India.

The moral of the story is that the problems of the developing countries are the most serious candidates for humane management of the recycling process. But within this group, the problems are vastly different. Among the nine developing countries which accounted in 1978 for three-quarters of developing country imports, the problem for all, perhaps excepting India and the Philippines, is whether they are overextended in commercial lending markets. For the 71 small importers the question is differentiating between poverty and smallness. Of the 71 small importers, 63 had 1978 income per capita figures below \$1,000; their collective 1978 oil imports amounted to about 560,000 barrels per day — at 1983 prices of, say, \$30 per barrel, a total of \$6 billion. Adding the oil import bill for India and the Philippines, the total requirement for financing of oil imports would be about \$12 billion per year in 1983 dollars. Some portion of this should be concessionary, and this is well within the range of the OPEC/World Bank/International Monetary Fund/OECD capabilities for, broadly speaking, short-term structural adjustment lending to these countries, if properly organized. But it is not yet clearly so organized.

This problem came into urgent focus in late 1982 as the prolonged recession made it increasingly difficult for many oil importing developing countries to service their international debt. Ironically, the decline in oil demand and real oil prices has also placed a number of the oil exporting countries in financial difficulty, compounding strains on the international monetary system. Action is being taken to cope with these emergency circumstances (e.g. by increasing the resources of the IMF). But the financial problems of several large developing countries are likely to persist for much of the decade, and further action of a more radical nature may well be required.⁴

Removing Investment Barriers

The second issue — removing barriers to surplus oil revenue investment — is at once more straightforward and more challenging. From 1974 to 1979, investment of surplus revenues (that is revenues from oil production of some countries — typically Saudi Arabia, Kuwait, U.A.E., Iraq, and Libya — above what they needed to finance domestic development and import requirements) sometimes failed to produce a real financial return, or produced a real return less than that which might have been realized from keeping the oil in the ground.

⁴ For one suggestion, see *IMF Borrowing in the Private Markets* Group of Thirty, 1983.

High real interest rates in the United States since 1979, and weak oil prices in 1981-83 have reversed this trend. But the issue could return.

During the period 1975-78, real oil prices fell, and investing surplus revenues in the economic recovery of the West and growth of the newly industrializing countries made very good financial sense. The second oil price increase of 1978-80, however, shifted the risk/return calculus in favor of oil in the ground. It became very difficult for surplus oil exporting countries to justify, domestically, excess production of a very attractive asset — oil in the ground — for financial assets which might yield a negative return in view of inflation rates, but in any case could almost never compete with the discounted future value of oil reserves.

The decline in oil demand after 1979 introduced a new factor into the decisions facing the surplus oil exporting countries. Recently most of these countries have encountered balance of payment deficits, requiring them to draw down financial assets and curtail imports. If the oil market in the future presents the surplus oil exporting countries with wide swings in demand, they will have to devise oil export and domestic economic development strategies which will permit them to acquire substantial financial assets when oil demand is high. In support of such strategies it will be important for the oil importing countries to enhance the opportunities for investment.

The first and obvious step is to remove barriers to investment in a broader range of assets available in oil importing countries. In the past it has been difficult for Arab oil producing countries to invest in certain kinds of real assets in some oil importing countries. No doubt this difficulty stemmed from concern in the oil importing countries about adverse public reaction. But the fact is that OPEC surplus oil producing countries have demonstrated that they are responsible and careful investors, respectful of national interests in the host countries and interested in financial return from, rather than control of, the assets in which they invest.

In the developing countries attracting surplus oil exporting country investment funds directly could be more difficult initially than attracting funds from the industrialized countries. But here too removal of domestic rules inhospitable to oil producing country funds will speed the flow of OPEC capital to developing countries and balance the investment portfolios of the surplus oil exporting countries. Moreover, it is evident that the flow of new bank lending to many developing countries has been sharply curtailed and may not quickly recover, so that they now have a strong incentive to attract funds directly from investors.

All oil importing countries are advised to review their tax treatment of surplus oil country exporting investments. Sovereign tax immunity improves the return from host country investments. Unfortunately it usually results from negotiated reciprocal tax treaties; many surplus oil exporting

countries do not tax commercial activity domestically and thus cannot offer reciprocal tax benefits to oil importing countries. But this is surely no more than a problem of negotiating jurisdiction: tax immunity in the oil importing countries might be granted in exchange for something else of value in the surplus oil exporting countries.

In the spirit of reducing financial market distortions and barriers to efficient recycling, it should be noted that seizure of financial assets for political reasons inevitably chills the financial markets. It breeds a kind of financial equivalent to trade nationalism, and should be broadly disavowed.

Conclusions

Past history has produced a climate of suspicion and occasional confrontation between oil importing and oil exporting countries — hardly a promising context within which to create the collaborative arrangements and confidence-building measures described here. Yet the critical importance to the world of the international oil market and the defects in its current structure and functioning will be of concern for the remainder of the decade and probably beyond. International anxiety about the oil market's structural defects itself could be a threat to the stability of the oil market.

From this analysis it is difficult to envision effective improvements in the structure and functioning of the oil market which do not involve some collaboration between oil exporting and oil importing countries. Indeed, it is the fact of collaboration itself, and the conditioning of expectations which it engenders, that constitute the main thrust of the considerations set forth here. Unilateral measures taken by either oil importing or oil exporting countries alone may not reach the structural problems identified, and could worsen them if matched by a confrontation response by the other side.

Collaboration, on the other hand, need not mean a formal agreement — still less a “planetary bargain.” It is hard to see how such an agreement could be reached, even if desirable, given the existing climate and the formidable political difficulties involved in all multilateral negotiations. A more promising approach may lie in the prospect that many of the suggestions outlined here might require only tacit agreement that national policies and international arrangements which are compatible, are desirable for all parties. Measures to improve the functioning of the oil market, for example in stock management policies, do not require irreversible steps on the part of one party which, in the event of apparent bad faith on the other side, might appear undesirable. The value and durability of such tacit arrangements can be tested over time. Financial facilities to assist developing countries, such as those currently under negotiation to increase the resources of the IMF, do require formal arrangements, but perhaps at less political cost or risk than matters dealing with the price and availability of oil at least in this field of international relations the machinery of cooperation is well-established — what has been lacking is the will to use it to the full.

In summary, it is desirable and may be feasible to construct arrangements among oil importing and oil exporting countries which would improve functioning of the oil market. This notion does not yet have widespread acceptance in either oil importing or oil exporting countries, though the outlines of it could quickly emerge in the right circumstances. The danger is that either a collapse in oil prices or a new emergency could arrive

very quickly — well before widespread acceptance of the need for cooperation and its modalities exists and enables governments in both oil exporting and oil importing countries fail to cope with it, the resulting political and economic damage and the ensuing bitterness will make it far more difficult for cooperation to flourish thereafter. On the other hand, successful cooperation now, even if limited, will establish the atmosphere and confidence that can permit more cooperation in the future.

Appendix 1

The Effect of Exchange Rates on Oil Prices

Edwin A. Deagle, Jr.

The fact that oil sold worldwide is generally priced in U.S. dollars means that delivered energy prices in countries other than the United States are partly determined in foreign exchange markets. When the dollar falls relative to other currencies, oil prices in those countries fall proportionately. When the dollar rises relative to other currencies, oil prices rise also. The tendency in foreign exchange markets to witness wide swings in the value of the dollar means that major shifts in oil prices can occur. Table I illustrates how currency fluctuations have boosted European and Japanese oil costs between 1980 and 1982.

It is difficult to know whether major changes in oil prices have an important influence on exchange rates, especially dollar rates. A substantial decline in oil prices in 1983, for example, would reduce the demand for dollars to clear international oil import accounts. This might bring downward pressure on the dollar exchange rates. But other forces related to economic recovery and to government policies could prove more important.

Table I

	Dec. 1980	Oct. 1981	Sept. 1982
Weighted Avg. OPEC Price	\$32.90	\$34.40	\$32.95
Real Local Cost*			
United States	32.90	32.60	30.62
Japan	32.90	37.22	39.86
Germany	32.90	36.53	37.00
France	32.90	38.13	41.81
United Kingdom	32.90	39.63	38.25
Italy	32.90	38.30	39.65

* Local average currency cost adjusted for inflation and expressed in 1980 dollars.

Source: *Petroleum Intelligence Weekly*, October 4, 1982, p. 2.

Appendix 2

Note on Availability of Non-Oil Energy Supplies

*Bijan Mossavar-Rahmani*¹

Two dramatic oil price increases and perceptions of insecurity of foreign oil supplies have provided the stimulus for stepped-up production and utilization of alternative energy sources in recent years.

Until the early 1970s, consumption of oil was growing at a rate much greater than that of all energy; by 1973, oil consumption comprised more than half of the total non-communist world (NCW) primary energy consumption. In the post-1973 period, however, the NCW energy mix has undergone a significant, and in all likelihood, lasting shift; oil consumption has grown at about 2 percent a year (as compared to nearly 8 percent before 1973) and its share of the total is expected to decline just over 40 percent by the end of this decade.

Coal

Coal, in turn, is projected to make particularly strong gains. In addition to meeting a growing share of new energy demand, coal is expected to replace oil in major industrial and utility markets. Between 1980 and 2000, NCW coal consumption is projected to increase from 20 million barrels a day of oil equivalent (MBDOE) to about 40 MBDOE. The conversion of coal to synthetic liquids and gases will not become significant until the end of the century, given the current investment climate and the long lead times for these projects. However, higher oil prices have made international trade in steam coal increasingly viable, and according to estimates, seaborne coal trade could quadruple between 1980 and 2000 to almost 8 MBDOE. The United States will remain the world's largest producer; the greatest constraints on coal output and use will continue to arise from environmental considerations.

¹ Member, Harvard Energy Security Program; Doctoral Candidate in Politics, Economics and Government at Harvard University.

Table I
NCW Primary Energy Consumption
(MBDOE)

	1970		1975		1980	
	MBDOE	(%)	MBDOE	(%)	MBDOE	(%)
Oil	39.5	(51.3)	45.2	(52.9)	49.0	(50.6)
Natural Gas	14.7	(19.1)	16.1	(18.8)	17.6	(18.2)
Coal	17.1	(22.2)	16.4	(19.2)	20.1	(20.8)
Hydropower	5.3	(6.9)	6.2	(7.2)	7.1	(7.3)
Nuclear	0.4	(0.5)	1.6	(1.9)	3.0	(3.1)
Total	77.0	(100.0)	85.5	(100.0)	96.8	(100.0)

Source: Adapted from British Petroleum (1981).

Table II
Projected NCW Primary Energy Consumption
(MBDOE)

	1990		2000	
	MBDOE	(%)	MBDOE	(%)
Oil	53	(43.4)	54	(34.6)
Natural Gas	23	(18.9)	26	(16.7)
Coal	22	(18.0)	40	(25.6)
Hydropower	8	(6.6)	10	(6.4)
Nuclear	11	(9.0)	15	(9.6)
Synthetics	3	(2.5)	7	(4.5)
Renewables	2	(1.6)	4	(2.6)
Total	122	(100.0)	156	(100.0)

Source: Adapted from Exxon (1981).

World natural gas consumption is expected to show steady growth over the next two decades in absolute terms, with most of this growth occurring in Japan and those developing countries with indigenous reserves. Substantial natural gas deposits have already been discovered in Latin America, North Africa, the Far East, as well as in the Middle East, which could support stepped-up regional and international trade. However, the natural gas export market is largely undeveloped because of the high cost of long-distance transportation, particularly where gas has to be proc-

essed for shipment in liquified form. Another important barrier to increased trade in natural gas has been consumer concern over added dependence on foreign sources of fuel supplies.

Nuclear Energy

The share of nuclear energy in total energy supply will increase during the 1980s, albeit at a lower rate than previously projected. Currently, more than 200 power plants are in operation in the NCW region, providing about 3 percent of total primary energy supply; this share is expected to double by 1985 as reactors now under construction begin operation. But the longer-term prospects for nuclear power have become more blurred as a consequence of growing public concern over safety hazards, environmental risks, waste disposal, nuclear weapons proliferation, and a changing cost picture. In one country, the United States, stringent regulations have stretched out the time needed to build nuclear plants to about 12 to 14 years. The International Atomic Energy Agency has recently estimated that after 1985, construction work on new reactors outside the centrally planned economies will be less than 5 gigawatts-electric a year as compared to more than 10 gigawatts-electric a year between 1981-1985. Existing and planned uranium supply and enrichment capacity will be adequate during this period, and are thus not expected to constrain nuclear growth if and when political attitudes towards this source of energy become more favorable.

Synthetic Fuels

Synthetic fuels — liquids and gases that can be derived from coal, heavy oil, oil sands, shale oil, and agricultural products — can make a growing contribution to world energy supplies, particularly as substitutes for conventional oil products and natural gas. Although subject to many uncertainties, synthetic fuels could provide as much as 3 MBDOE by 1990, growing to 7 MBDOE by 2000. These estimates are technologically feasible, but are highly dependent on government policies and regulations relating to environmental protection and access to resources. Moreover, as most processes are very costly and have yet to be demonstrated in plants of commercial size, substantial government commitment and at least initial financial support are prerequisites to the establishment of synthetic fuels industries. Because of its vast coal and oil shale deposits, as well as its technological and financial capabilities, the United States has the greatest potential for the production of synthetic fuels, and its policies will influence the rate of development of synthetic fuels elsewhere. Other countries with major potential include Canada, Venezuela, Brazil, and Australia.

Renewable Resources

With the exception of hydropower, renewable energy resources will not become significant in the next two decades. Hydropower currently provides about 7 percent of total NCW primary energy consumption; future growth in output will be concentrated primarily in a few sites with relatively large capacity in Latin America and Canada. The total contribution of other renewables, notably solar energy, direct biomass (including wood wastes, firewood, and crop residue), alcohol fuels from biomass, and tidal, wind, and wave energy is projected to increase from more than 1 MBDOE to almost 4 MBDOE or some 2 percent of the total by 2000. Ultimately, the two most promising sources of renewable energy — nuclear fusion and photovoltaic electricity — may make substantial contributions to world energy supplies, but the prerequisite technical and cost breakthroughs are not expected to take place before the end of the century.

Appendix 3

Oil Stockpile Management and the Stability of the World Oil Market in the 1980s

*Edward N. Krapels*¹

It is ironic that stockpiles of crude petroleum and refined products have become an unsettling force in the relationship between oil exporting and importing countries. In 1973-74, and again in 1979, the management of global stocks put upward pressure on prices. In contrast, from 1975 to 1978, and again in 1982 and early 1983 the management of stocks exacerbated downward pressure on prices. These swings in price were regarded as crisis to those on the losing side, and as victories of a sort to those on the winning side of the trend.

The irony rests in how at odds this unsettling role is with the ideal role of stockpiles, one in which properly managed stocks remedy price instability in the world oil market. Economists have long recognized that buffer stock programs set up by importers and exporters of an internationally traded commodity can operate to the advantage of both groups in the long run. In principle, a buffer stock can prevent the need first for importers and then for exporters to adjust to large losses in (planned) income forced on them by drastic and unforeseen swings in the commodity price or revenues. In practice, a buffer stock program requires scarce inputs like political cooperation between exporters and importers to set it up, and sufficient wisdom on the part of the stock administrators to sell and to buy at the right time, in the right quantities and at the right price.

There are numerous reasons why even the first requirement — sufficient political cooperation — is absent. Stocks are a manifestation of the dearth of goodwill between exporters and importers, and simultaneously one of the chief obstacles towards an improvement in that relationship.

The extremely high level of oil stocks held recently and the well-publicized plans of the United States, Japan, and others to acquire substantially more oil for strategic stocks in the years ahead are signs of the industrialized countries' lack of confidence in the stability of oil trade. During 1981, the member-states of the International Energy Agency (IEA) had on-land

¹ Energy Security Analyst, Washington, D.C.

stocks averaging 300 to 500 million barrels more than historic levels.² At today's prices, this cushion represented tied-up capital of up to \$16 billion. At U.S. prime interest rates near 18 percent, the carrying cost alone on this oil was \$240 million per month.

The sheer magnitude of consumer stocks is understandably provoking some anxiety among oil producers, especially the oil exporters able to put all their oil revenues to immediate use. By the end of 1981, oil exporting countries could not be blamed for believing that the emergency stocks of importing countries would be (and perhaps since have been) used to fight OPEC pricing decisions. To make matters worse, stock drawdowns (like the embargo directed against the United States in 1973-74) can in principle be targeted against particular exporting countries. In this case, the OPEC members losing market share will put pressure on other producers for help.

A question of policy is whether governments can progress from the current situation in which stocks are a destabilizing force in world oil trade toward a situation in which stocks are managed in a way that contributes to orderly conditions in the world oil market. If this search is not to wander into abstractions, it must take as given the many extraordinary features of the world oil situation: the sheer indispensability of world oil trade, the changing commercial structure of the world oil market, importers' need for supply security and cost stability, and exporters' need for revenue stability. These and other features determine the need for pragmatic measures. A constructive approach is to orient the policy search around confidence-building measures. Oil exporters and importers can explore stock management policies that will erode the climate of suspicion that exists. To do so, it is useful first to look briefly at the experiences that have led to the present state of affairs.

International Oil Stocks in the 1970s

Most importing countries entered the 1970s with poorly developed oil storage programs, and even more crudely developed ideas about how to use the stocks they had on hand. After the oil crisis of 1973-74, the attention of most legislators was on how to finance and administer stock programs. The key issue for most governments was how to design regulations that imposed an equitable burden on the various types of oil companies in the market.³ Very little effort was expended, at least on the national level, on designing a drawdown strategy.

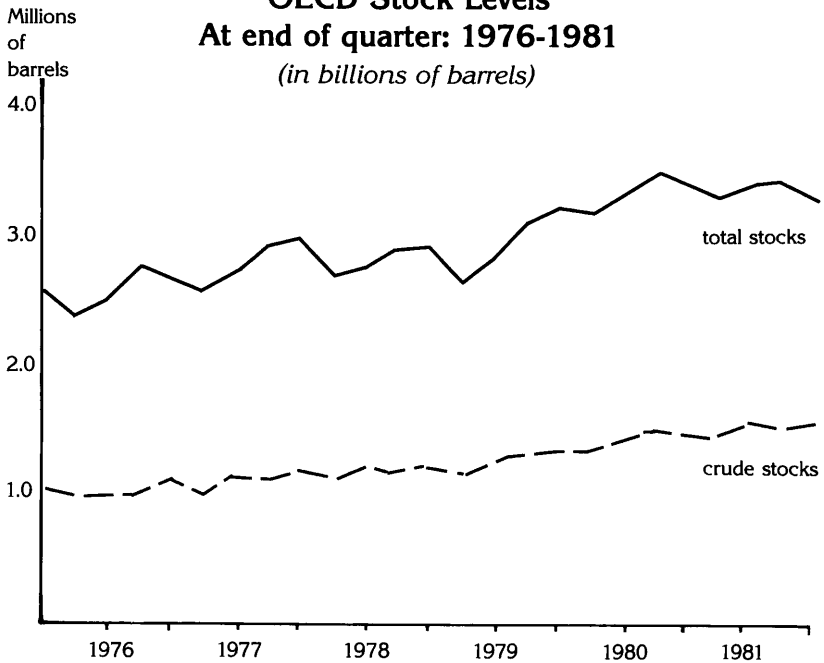
In the course of the decade, most of the countries joining the

² IEA country oil stocks amount to about 3 billion barrels, while world stocks average about 10 billion barrels. See pp. 00-00 in text of Report.

³ Companies that imported only finished products argued that imposing the same 90-day obligation on them as on refiners was unfair: refiners must hold proportionately larger

Figure 1

OECD Stock Levels
At end of quarter: 1976-1981
(in billions of barrels)



International Energy Agency in 1974 took steps to comply with its requirement for the maintenance of an emergency stock equivalent to 90-days of the previous year's net imports. There were, however, two prominent exceptions to the 90-day trend: the United States and Japan set much higher stock goals.

For a well-documented variety of reasons, the United States was particularly unsuccessful in meeting the storage objectives it set in the mid-1970s. By the end of 1980, according to the initial plan released in December 1976, there should have been 325 million barrels of government-owned crude in the Strategic Petroleum Reserve (SPR). Instead there were only 100 million barrels. By the end of 1982, however, the active stock-building policy of the Reagan Administration had resulted in a rapid increase in the SPR size to 300 million barrels. Japan was more successful. It set out to acquire 63 million barrels for government storage (actually, Japan National Oil Corporation has been the agent) by 1982. As of the middle of 1982, about 70 million barrels were in place, stored in idle tankers anchored off the coast. Another 113 million barrels are to be acquired by 1985.

operating inventories than product importers, hence the real cost of a 90-day requirement would be far larger for the product importers.

In spite of their impressive ultimate objectives and scope, neither the American nor the Japanese program made an important impression on the world-wide oil supply and demand pattern in the 1970s. Insofar as stock movements did affect world oil trade and prices, the inventory management of the oil companies was of far greater import than the strategic stock moves of governments.

Figure 1 illustrates the development of OECD total inventories (crude oil and finished products are combined) and of crude stocks only during the period 1975 to 1981. Total stocks fluctuated between a low of 2.4 billion barrels at the end of the first quarter of 1976 and a high of 3.5 billion barrels at the end of the third quarter of 1980.

These rough-grain data obscure, however, the very sizeable impact that changes in stock levels can have on the *flow* of the world oil. Figure 2 provides a view of daily average flows of oil into and out of the OECD stocks on the basis of the quarter-end stock data. As noted, stock drawdowns at a quarterly average rate of 3.85 MBD occurred in the first quarter of 1978, a flow equivalent to the production of several OPEC states. One must be careful not to take an exaggerated view of the impact of these stock swings on international oil trade. In fact, about 2 million MBD of the 3.85 million MBD stock drawdown can be attributed to an unusually heavy demand for heating oils in the first quarter of 1978. Crude oil stock drawdowns, which obviously reflect more directly the need for oil from exporting countries, averaged only about 0.215 MBD in the first quarter of 1978.

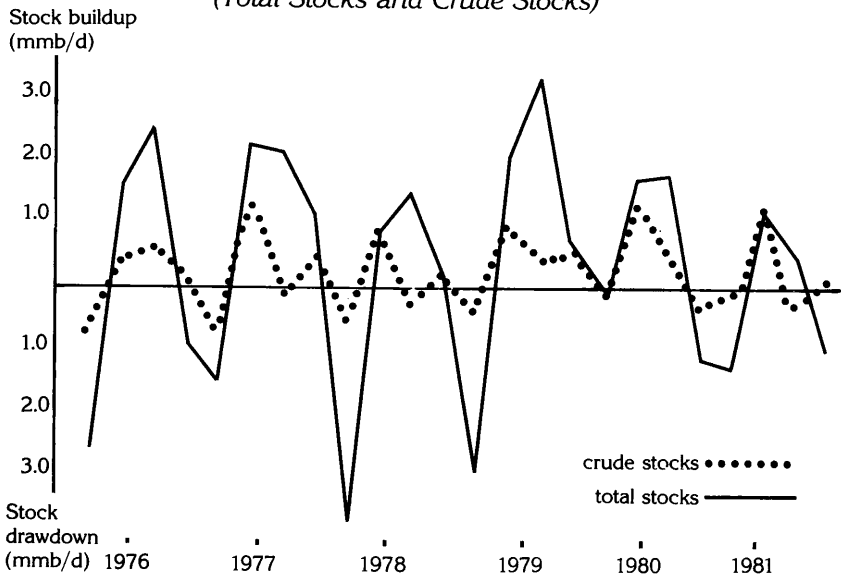
Crude oil stocks fluctuate with less regularity and depth than total stock levels. The most consistent pattern for crude in Figure 2 is the trough at the end of the first quarter. This results principally from the oil companies' tendency to sell off that quantity of oil that may have been acquired for speculative purposes just prior to the December OPEC meetings. Aside from this modest aberration, it is the small fluctuations in crude stocks that can be seen as representing the industry's collective inventory strategy from 1974 to 1979.

That strategy seems during this period to have been to keep crude stocks at an even keel. There was a slight upward trend in crude stock levels, as evidenced in Figure 1. In 1976, quarter-end stocks averaged 1.065 billion barrels and 1.192 billion barrels in 1978.⁴ The growth in the U.S., Japanese, and West German *government* stockpiles, however, accounted for most of this gradual increase.

In retrospect what seems surprising to many is why there was not an

⁴ Refinery throughput surges occur in the fourth quarter, not in the first. Hence, the sharp drop in crude stocks in the first quarter cannot be attributed to higher throughput. The speculative stockpiling theory given above is supported by the fact that OPEC production has almost always fallen in the first quarter.

Figure 2
OECD Stock Drawdown & Buildup
(Total Stocks and Crude Stocks)



incentive for companies to keep much higher stocks. Essentially, of course, the reason must be that oil companies did not find it profitable to do so. During soft markets, the so-called obligatory stock levels generally required by governments (with the outstanding exception of the United States) are viewed as major financial millstones by the companies. For example, the industry fought the German government for years in the courts to prevent higher storage obligations. In the United States, company spokesmen time and again argued against any suggestions that the government mandate any storage requirement on them.

The source of this resentment was the widespread and persistent softness of product prices during the 1975-78 period. In many countries, retail prices not only did not rise enough to keep up with inflation, they fell in absolute terms.⁵ Product spot market prices in 1976 and 1977 were rock-steady. Gas-oil prices (FOB Rotterdam), for example, were between 110 to 130 dollars per metric ton during this entire period. In contrast, in 1979 the range of gas-oil spot prices was 150 to 390 dollars per metric ton.

During the 1975-78 buyers' market, the inventory management practices of the oil companies could have confronted OPEC with a far more serious supply planning problem than they actually had. A deliberate and sustained drawdown of stocks in early 1976, when OPEC production was

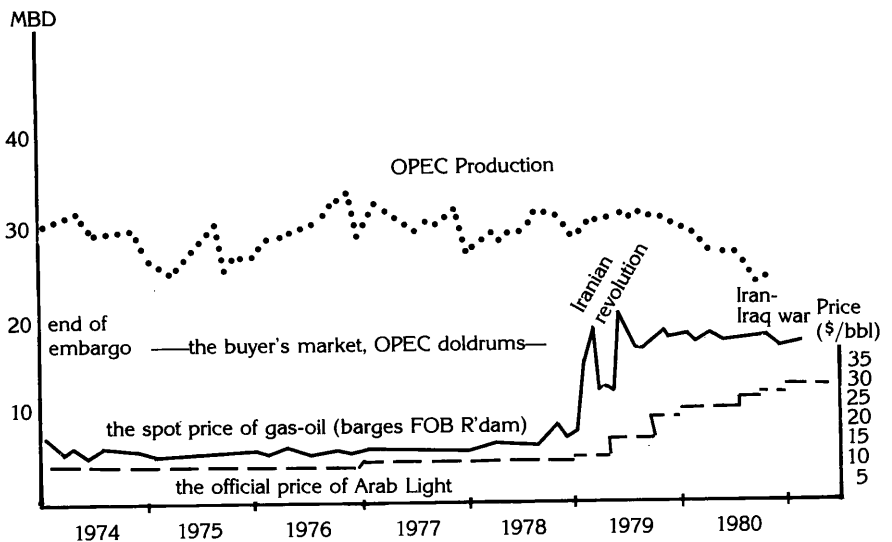
⁵ For example, in Japan the wholesale price of gasoline fell in 1978 from 105 to 98 yen per liter.

down to 25 million barrels per day, might have put pressure on some OPEC countries to discount prices even more than they did.

Figure 3 suggests that a deliberate consumer drawdown might have had quite a strong impact on OPEC in the first quarter of 1977 or 1978. In the wake of the December price meetings, demand for OPEC oil declined sharply (5 MBD for a month or two before recovering.) To explore what impact a deliberate stock drawdown policy might have had, assume that in 1977, due to the split in OPEC pricing policies, consumers decided to draw down stocks in a way that was targeted on the OPEC price "hawks," in this case all members save Saudi Arabia and the United Arab Emirates. The production by the price hawks was 23.2 MBD in December 1976. In January 1977 it fell by 20 percent to 18.6 MBD. In February their output recovered to 20.5 MBD, in March to 21.2 MBD.⁶ Now suppose that, in order to demonstrate their displeasure with the price increase, the importing countries had decided to reduce their demand by an amount sufficient to maintain the price hawks' 20 percent loss in sales in January. Assuming that consumer demand is adequately represented by the above-mentioned sales figures for February and March, the importers would have had to draw down their stocks by 1.9 MBD in February and by 2.6 MBD in March. That would have been a total stock draw of 134 million barrels. That amount, in

⁶ Figures from *The Petroleum Economist*, November 1977, p. 461.

Figure 3
OPEC Production, OPEC Price, Spot Price: 1974-1980



turn, would have been equivalent to approximately four days' worth of OECD imports. Assuming the importing countries believed they had ample stocks to begin with, a drawdown of four days' worth of imports to keep pressure on the exporters for 60 days may have seemed worth the cost.

Of course, this or any other drawdown was not considered because governments of importing countries did *not* believe they had ample stocks to begin with. The rather small emergency reserves most countries possessed were deemed to be too important to be used in anything short of a major disruption. Hence, there is something to the notion that the importers' own storage policies, and attitudes, helped the oil exporters maintain oil prices during the 1975-78 buyers' market. Producers can have no assurance, however, that a better-stocked, more confident group of importing countries will not use stocks in the way described above in the future.

International Oil Stocks from 1979 to 1981

One of the reasons consumers may be more confident about using stocks for price-control purposes in the future is that they have been through one crisis that demonstrated the consequences of not using stocks for price control, and one which seems to have demonstrated that stocks can be used for price control purposes.

The international oil supply disruption touched off by the revolution in Iran brought home to governments of importing countries that they had no practical plan for using the emergency reserves that had been maintained or accumulated since the Arab oil crisis of 1973-74. As already mentioned, the oil companies were maintaining inventories at levels near minimum operating requirements (in the United States and Canada) or minimum obligatory levels set by government (Europe and Japan). By the second half of 1978, industry crude stock levels were probably lower than in the second half of 1976 or 1977. Hence, the cessation of Iranian exports occurred at a point when industry inventories were anything but flush. As a consequence, throughout 1979 companies appeared to be orienting their purchases not at *maintaining* stock levels, as was their strategy in the 1975-78 period, but at *building* them up. Although this is absolutely understandable from the firm's point of view, it was not good state policy, because it created a demand for stocks, a "shadow demand," as it were, that put great upward pressure on oil prices in the open markets.

The first signs of pressure came, as expected, from the spot market for finished products in Europe. As Figure 3 indicates, the price of gas-oil, the most important product volumetrically, reached \$45 per barrel in February. Spot crude prices, according to the *Petroleum Intelligence Weekly*, followed the more volatile product quotes. Arab light, whose official sales

price was \$13.34 until April and \$14.55 until June, was sold in the spot market for \$15.95 in January, \$19.50 in February, \$20.80 in March, \$21.20 in April, \$34.25 in May, until finally breaking in June at \$32.85⁷

Given the scale of these increases, oil companies could easily figure the benefits of increasing inventories in preparation for the increase in official OPEC prices that everyone was certain would come. In these circumstances, there was virtually no incentive to draw down stocks. To the contrary, there were strong incentives to build up stocks; and that is what some companies did. After years of trying to minimize stock levels, oil companies went on an unprecedented buying spree, as Table 1 shows.

There are, no doubt, many reasons for the dramatic increase in stocks that began in the third quarter of 1979 and continued through the third quarter of 1980:

1. Oil companies everywhere underestimated the decline in demand that accompanied the increase in oil prices in 1979. Yet that factor alone is insufficient, because such a miscalculation could have been corrected in the first quarter of 1980. To the contrary, Table 1 indicates that stocks continued to climb in that quarter.

2. The industry's confidence in the security of its oil supply deteriorated. It should not be surprising that those companies that had been accustomed to receiving their crude oil from Exxon or British Petroleum and had now to buy from the National Iranian Oil Company (NIOC) would be prone to carry high safety stocks while getting acquainted with their new supplier. Perhaps this explains best the very large increase in Japanese stocks, because Japanese firms were in the front of the queue at NICO's door.

3. Simple speculation. Companies were willing to gamble that the OPEC price hawks would succeed in forcing Saudi Arabia to increase its official sales prices in the second half of 1979, thus providing companies with inventory profits. In addition, investments in inventory provided a shelter against the extraordinary profits that some companies were earning.

4. Building large inventories was not only a good investment in the climate of 1979 — because a substantial increase in official prices seemed inevitable — it was also good politics. Holding large inventories, in effect, was not only the result of a miscalculation of the demand response to higher oil prices, it was economically, politically, even strategically advisable in 1979. In 1980, some of these conditions changed.

In early 1980, a number of signals pointed to more normal stock maintenance by the oil industry. First, prices in the spot markets steadied. Gas-oil quotations in Rotterdam stabilized around the \$300 per metric ton (\$40 per

⁷ *Petroleum Intelligence Weekly*, April 21, 1980.

Table 1

**Industry Crude Oil Inventories in Selected Countries:
1979 Through 1981**
(*millions bbls*)

	United States ¹	Japan ²	France	West Germany ³
January 1979	302.7	187.1	59.6	76.9
March	317.4	186.2	55.6	78.5
June	325.9	190.3	71.6	81.6
September	323.9	188.8	67.3	97.1
December	339.1	216.2	66.4	95.4
March 1980	361.7	209.7	75.8	86.9 ^e
June	382.0	234.3	77.4	91.5 ^e
September	376.5	246.4	75.6	97.1
December	370.2	238.0	71.4	98.3
March 1981	393.0	211.6	69.5	97.2
June	384.7	240.3	79.5	n.a.
September	356.0	240.0	73.9	n.a.
December 1981	363.5	226.3	67.2	n.a.
March 1982	365.7	233.1	70.5	

Sources: U.S. Department of Energy, Comite Professionnel du Petrole, Petroleum Association of Japan, Mineraloelwirtschaftsverband.

Notes: (1) Excludes the Strategic Petroleum Reserve, which contained 73 million barrels in January 1979, 91.2 million barrels in January 1980, 112.4 million barrels in January 1981, and 270 million barrels in August 1982. (2) Excludes the oil held by the Japan National Oil Corporation, which amounted to 35 million barrels in 1979 and 1980, increasing to 48 million barrels in 1981. (3) Excludes oil held in the Federal crude oil reserve, which amounted to 44 million barrels in 1979 and 1980, increasing to 54 million barrels in 1981.

barrel) mark, and did not deviate by more than \$30 per ton from that mark all year — a placid performance in comparison with 1979.

Second, a return to a semblance of normality in the spot markets helped independent importers of finished product regain some of the ground they lost in the European market in 1979. Increased competition resulted in softer downstream product prices, and thus to a gradual deterioration of the outstanding profitability of most established refining companies in 1979. This decline in profitability also augured for a reduction in stock levels.

A third signal pointing to a large drawdown of stocks in 1980 was the rising cost of capital in all industrial countries. In the United States, interest rates peaked in March 1980, plummeted by more than 50 percent by June, then rose again to exceed the March level in December. In Japan, the trend

was somewhat similar. Interest rates on call money started the year at 8 percent, rose to almost 13 percent by mid-year, and then fell back to 9.5 percent by December. A comparable pattern developed in France, West Germany, and in the Eurocurrency market.

Yet, in spite of the increased cost of money, crude stock levels did not fall in 1980; they remained high in spite of the cost. As it happens, this turned out to be quite beneficial: with high stock levels, the marketplace did not become a scene of panic when the Iran-Iraq conflict erupted in the fall of 1980.

In addition to high stock levels, however, an examination of the structure of the disruption reveals other factors behind the market's apparent indifference to the oil loss in the Gulf.

The countries most severely affected by the loss of Iranian and Iraqi oil were Japan, France, Spain, Portugal, Brazil, Italy, and assorted developing and East-bloc countries. As it happens, these are countries in which government or its agents traditionally exercise considerable influence in the activities of the oil industry. The OECD countries in this group all require companies to maintain a 90-day obligatory stock. Italy and France have very experienced state oil companies that can and have acted as procurer of oil for the home country.

It is noteworthy, therefore, that the early reactions of Tokyo and Paris included warnings to oil firms serving their markets not to procure high-cost crude on the spot markets. The French government reportedly also ordered companies *not* to draw down stocks below a level equivalent to 100 days of their sales (ten days' worth of supplies more than the normal minimum). Japan's Ministry of International Trade and Industry exercised "strong administrative guidance" over national firms that reportedly included an oil import price selling. Both Japan and France, who have been criticized in the past for their efforts to make government-to-government deals, dispatched their diplomats again, but this time with no adverse reaction from allied countries. Both governments reported considerable successes, about which many outside observers remain skeptical. Yet, few have considered the psychological boost that a government-to-government deal can provide.

In essence, some oil-exporting countries took on the role as crisis-managers for the world oil market. This effort coincided with, and to a large extent gave credence to, the crisis-management effort that went on within the IEA group of countries. In early October 1980, and again in December, the IEA delegates deliberated over the state of the world oil market, counseled participating oil companies to refrain from bidding up the price of oil in the spot markets, and urged companies to draw down stocks in a manner "sufficient to balance supply and demand." By February 1981, IEA officials

were pointing to the tranquility of the spot market and to reports that some producers were actually offering discounts to buyers in order to sell excess crudes as evidence that the collective drawdown program had worked.

In fact, however, the consultations among IEA countries and companies was but a minor factor. The cooperation of the oil exporters in increased production, and the restrained search for substitute oil by the directly affected oil importing governments were more telling factors. As a result, stock drawdown policy was, once again, *not a major element* in the management of an international oil supply disruption.

The Role of Stocks in the 1980s

Coming into 1982, it was encouraging to note that the world has avoided the two extremes that would have been most damaging in the wake of the Iran-Iraq war: a too-rapid drawdown of emergency stocks that would have left the directly affected countries — Japan, France, Brazil — feeling edgy, and a too-rapid build-up of stocks that might have precipitated a 1979-like price explosion.⁸

One of the consequences of this successful transition (from a market in which Iran and Iraq were major forces in oil trade to one in which they are not) was that it encouraged various governments to believe all the more strongly their models of how the world works, and what the best policies are. Thus, advocates of letting market forces flow unhindered felt vindicated, while proponents of state intervention and *dirigisme* also felt triumphant. Within the EEC and IEA groups, the Germans, British and (since February 1981) Americans favored a *laissez faire* approach to so-called “sub-trigger” supply disruptions,⁹ the French, Italians and many smaller countries favored the *dirigiste* approach.

In view of these significant differences in policy orientation, the role that importing countries will allow their emergency stocks to play in the world oil market of the 1980s is not readily apparent. To capture the range of possibilities, three types of multinational stock drawdown or usage policies must be distinguished. The *minimalist* policy is a reflection of current U.S. policy toward oil: government stocks are only for dire circumstances, as defined, for example, in the International Energy Program. The second policy is that typified by French policy, and can be viewed as an *interventionist* approach: governments of importing countries can use

⁸ Some countries, notably Turkey and Portugal, did experience worrying supply problems and stock drawdowns. It was their unwillingness to pay the high marginal prices, rather than the sheer unavailability of oil, that caused these countries to have to draw down stocks in late 1980.

⁹ A supply reduction falling short of the 7 percent level needed to trigger the IEA oil-sharing program.

stocks selectively to redress spot price explosions and local or national shortages. The third approach is seldom discussed in importing country policy discussions, because it is so remote at present. That is the *dominant* approach, which calls on importing countries to amass sufficient inventories to give them the power not only to protect themselves against embargoes, and to contain explosions in the spot market, but also to heavily influence (and ideally to dominate) OPEC oil pricing decisions.

Looking at stock policies volumetrically, the present trend of the importing countries appears to lead to stocks too big to leave governments satisfied with a minimalist policy, but too small to allow a policy of dominance to be pursued realistically. Proper study of these assertions would involve forecasting oil supply and demand, the absorptive capacity of Saudi Arabia, and so forth. The principal parts of the argument, however, can be summarized as follows:

IEA/OECD emergency reserves will grow by at least 500 million barrels during the 1980s as a result of the development of the U.S. Strategic Petroleum Reserve and, to a lesser extent, additions to the Japan National Oil Corporation stockpile. Given the security-orientation of the new U.S. Administration, a 500 million barrel SPR is probably the smallest being contemplated, in spite of the budget-cutting in Washington.

At the same time, movement towards an IEA/OECD stockpile that could be a dominant factor in world oil pricing is being checked by the reluctance of most other IEA countries substantially to enlarge their emergency reserves. It is possible that in the near future a proposal to increase the minimum storage obligation to 100 or even 120 days' worth of net imports will be made. Most member states do not want to have to share the financial burden with the industry to pay for such an increase, as would be necessary under most of the obligatory storage statutes. Therefore, it is unlikely that such a proposal would pass a vote in the IEA.

Industry's discretionary inventories — that is, stocks in excess of the minimum obligations in Europe and Japan and in excess of minimum operating levels in the United States and Canada — will go up and down in reactions too complex and unpredictable for governments to manipulate. The very high stock levels of 1980-81 will seem anomalous a few years hence.

The importing countries now have almost enough oil in emergency stocks to be able to design and employ an interventionist stock management program. The main stumbling block is that the United States government totally lacks the desire to intervene in "sub-trigger" situations. This is ironic, because the SPR is growing so rapidly that there will soon be enough oil in the Reserve to justify contemplation of interventionist programs.

From the oil exporting nations' perspectives, in attempting to forecast the effects of OECD stocks on their interests, prudence dictates a balanced approach. It would be foolhardy to discount altogether the influence of deliberate stock policies, but it is also unnecessary to view them as the

cutting edge of an effective monopsony. A more balanced view is that the use of stocks by governments will be sufficiently difficult to prevent a dominant strategy from succeeding all the time but not some of the time, and that controversy among importing countries using stocks in "sub-trigger disruptions" to quell spot market prices will arise again and again.

The difficulty that importers will have in agreeing to a stock draw-down strategy is best reflected in the very crude state of proposals that are under government review. In the past two years, the following have been publicized:

Continuation of *ad hoc* consultations between governments and oil companies. A key choice here is whether to pursue this option within the IEA framework, or to develop an alternative. The latter option may facilitate cooperation by oil producers.

A modified IEP. This uses the existing IEA framework of allocation rights and obligations, but lowers the trigger level, (that is, the amount of oil

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A modified IEP. This uses the existing IEA framework of allocation rights and obligations, but lowers the trigger level, (that is, the amount of oil loss that activates the program). Other modifications could be devised to make the allocation/stock program more workable.

The stock "pool" proposal. Each country contributes 4 days' work of consumption to an international oil pool, or buffer stock. If all OECD countries were to join, the pool would contain about 130 million barrels. Upon declaration of a "localized deficit" by the group, the country or countries affected by the oil disruption have a right to purchase up to 50, 66, 75 percent of the oil depending on the number of countries affected.

A company stock "pool." Each company would sell five days' worth of oil to a central agency. When a disruption occurs, those companies directly affected would have a right to repurchase the oil at the average price during the previous quarter.

A "classic" buffer stock would differ from the third proposal principally by virtue of requiring the participation of the exporting countries. A buffer stock buys oil when the market is slack, sells it when it is tight.

The small-group approach can actually be applied to any of the other options listed above. It is listed separately to give credit to the unusually strong appeal this option has for many who believe that IEA, EEC, or even OPEC coordination is needlessly cumbersome. The "big three" of the importing world (the United States, Japan, and West Germany) could exercise considerable weight in the oil market if they coordinated their stock build-up and draw-down policies.

The proposal of the Commission of the European Community, submitted to the Council of Ministers in October 1981, is that Member Countries will lower their mandatory stock requirements in a tight market from 90 to 85 days. Recognizing that some countries and some companies will have to draw down stocks more rapidly than others, the proposal calls for a kind of guarantee in which the other countries provide enough oil to the disproportionately affected country to prevent deterioration in its stock position.

At the moment, the Reagan Administration does not favor any of these sub-trigger schemes. As the SPR grows, however, its potential power will become more apparent, and interest in using it will rise. That suggests the pertinent issue for oil-exporting countries is not how to stop countries like the United States and Japan from stockpiling, but how to react to the prospect of coordinated stock management by their customers. It is not at all clear that the use of stocks in response to a "sub-trigger" disruption must always be against the interests of oil-exporting countries. Indeed, insofar as it removes the pressure on them to act as crisis-managers, coordinated stock drawdowns make life easier for countries like Saudi Arabia.

It is premature to propose a program combining importing country and exporting country actions during the supply crises. It is not premature, however, to suggest that the emergence of substantial emergency reserves calls for the development of new understandings about the roles of governments in supply and price disruptions. What should be the implicit and perhaps subsequently explicit "rules of the game" during the next few years?

The experiences of the past several years provide a number of candidates that pertain directly to oil stockpiles.

Rule 1: Governments of oil-importing countries should not view emergency stocks as a panacea. Their effect on the market will be difficult to predict. For example, stock drawdowns may dampen spot price increases but not prevent increases in OPEC's government sales prices.

Rule 2: Governments of oil-exporting countries should not regard emergency stock buildup as necessarily inimical to their interests. There is a possibility that stock drawdowns will be the edge of monopsony power, but that will be more a function of the excess of (potential to) supply over demand than of stock levels *per se*.

If there is something to these rules, then emergency stocks need no longer be viewed solely as an instrument of importers against exporters, as a deterrent against embargoes. They might be viewed, instead, as a medium for bargaining in the years ahead.

Put in another way, stock drawdowns and buildups could become central ingredients in the formulation of broader rules whose function is to prevent extreme disorder in the oil system. For example, in times of extreme oil surpluses, an agreement to stockpile by importers might be coupled with price moderation by exporters. In times of shortages, an agreement by exporters to activate shut-in production might be coupled with stock drawdowns by importers.

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Address inquires to:

The Group of Thirty
Two World Trade Center
Suite 9630
New York, New York 10048
Tel: 212-775-9160

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry, no matter how small, should be recorded to ensure the integrity of the financial data. This includes not only sales and purchases but also expenses and income. The document further explains that regular reconciliation of accounts is essential to identify any discrepancies early on and prevent them from escalating into larger issues.

In addition, the document highlights the need for transparency and accountability in financial reporting. It states that all stakeholders, including management and investors, should have access to clear and concise financial statements. This helps in making informed decisions and building trust in the organization's financial health. The document also mentions the importance of adhering to relevant accounting standards and regulations to ensure compliance and avoid legal penalties.

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