1978

Political Economic Cartels: an Alternative Approach to the World Oil Market.

Sam Johnson Fraser
Louisiana State University and Agricultural & Mechanical College

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A DISSERTATION

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requirements for the degree of
Doctor of Philosophy

in

The Department of Economics

by
Sam J. Fraser
B.S., Tulane University, 1970
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August, 1978
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ABSTRACT

World energy problems have claimed a large, albeit diminish­
ing, share of international attention since the winter of 1973-1974. This diminution is reflected by the adjustment of energy consumers to the large increase in petroleum prices and the apparent acceptance of these levels as permanent by energy analyses in government and some academic circles. Acceding to excessive levels for crude oil prices can perpetuate a balance of payments distortion and a source of inflation in the importer coun­tries, as well as precipitate the rash adoption of unproven alternative sources of energy and unnecessarily harsh energy con­
servation measures.

This study investigates the effects that two recent trends, nationalization of oil production by exporter country governments and importer country cooperation through the International Energy Agency (IEA), can have on the primary source of high oil prices, the market power of the Organization of Petroleum Exporting Countries (OPEC). Sources of that market power are enumerated by reviewing the historical development of OPEC's dominance in the world oil market and the structural factors that facilitate price control by the group of countries that form the oil-export cartel.
The impact of nationalization is inferred within the framework of a limit price model of the economic self-interest of the national members of OPEC. Nationalization is viewed as enhancing the role of political or noneconomic costs and benefits in the collective price decision and enforcement process carried out by cartel producers. A review and application of factors identified in the literature on public enterprises and on international relations reveals two offsetting influences. Political rewards may help harmonize disparate economic interests within the cartel as to the proper limit price level, but sovereignty concerns can be expected to impede efforts to execute tactics that take advantage of that greater uniformity of interest. The political amplification of an asymmetrical economic loss inflicted on different members of the seller group by the prospective entry of energy alternatives enhances the risk that chiseling will destabilize this cartel and the price it sets.

Antagonistic responses by the IEA can provide the focal point that overcomes the inability of OPEC members to execute more deliberate market control measures, just as complete inaction by importers can permit the monopoly performance of the insecure export cartel to persist. Bilateral monopoly analysis indicates that monopsony bargaining and/or a selective emphasis on conservation measures by the IEA countries will be less successful at inducing OPEC to lower its real selling price than policies that permit or advance the rational development of energy alternatives.
The principal conclusion emerging from this study is that nationalization together with importer resistance have the potential to undermine OPEC's ability to maintain or raise the current real price of crude oil in the world. Activating this potential calls for more unity of purpose than major importers have shown to date, however. This condition is unfortunate since policies available to governments in oil-importing nations appear more capable of producing a downward adjustment in the long term path of real oil prices following the nationalization of oil-producing properties in OPEC.
PART I

NEW DEVELOPMENTS AND SOME RECENT HISTORY
CHAPTER ONE

PROBLEM AND AN APPROACH

World energy problems have claimed a large, albeit diminishing, share of international attention since the winter of 1973-1974. The quadrupling of crude oil prices and the temporary supply interruptions of that period awoke industrial nations to their heavy and growing dependence upon abundant quantities of crude oil from the Middle East, Africa, and Latin America. Problems associated with excessive energy prices, balance of payments distortions, resource depletion fears, and dependence on potentially unreliable sources remain of real concern.

Anxiety over these problems seems to have subsided somewhat since the initial disruptions of 1973-1974. Consumers in energy-intensive economies appear to have adapted to the significant increase in the relative price for petroleum products. Officials in major importer countries, who were initially caught unprepared by the radical price change, now seem reconciled to a future of increasing scarcity and prices for crude oil from their current levels. Many economic analyses of price and output behavior and prospects in the world oil market that emerged shortly after the

---

1 The Wall Street Journal, Friday, May 27, 1977 makes the comment, for instance, that the U.S. Government seems to have adopted an "inventory-clerk's" mentality as evidenced by its espousal of the idea that oil and natural gas are resources whose dwindling nature must now be recognized and adjusted to.
sudden price increase have also accepted the new level as given.\(^2\)
This acceptance of current price and output patterns, and adaptations to them, may be premature.

Two recent developments, the nationalization of crude oil producing properties by governments in major oil-exporting regions and interest by officials in major oil-importing countries in coordinating energy policy, alter the conditions under which the current real price level for oil was achieved. If these developments can be expected to affect the stability of the existing price, then ignoring them can immobilize efforts to correct excessive energy prices, needlessly perpetuate balance of payments problems connected with oil imports, and provide an unnecessary source of world inflation. It seems appropriate, therefore, to investigate some anticipated effects of nationalization and importer coordination on the durability of the present world oil price.

The expected effects of nationalization and oil-importer coordination on the stability of the real price of oil at or above the level achieved in the mid-1970's are the topics of this study. The impact of these developments can only be understood within the

context of recent history. Given this institutional setting, theoretical abstractions can assist in identifying key economic and political influences on price stability. A convenient approach is to select the appropriate economic model, determine its implications for world oil price stability, and assess the robustness of these implications given the political factors endemic to exporter nationalization and the countervailing influence introduced by coordination among importer governments. Since this approach should more accurately indicate the relative stability of current oil prices, this study describes, theoretically interprets, and evaluates the impacts of exporter nationalization and importer coordination on the stability of the current real price of oil.

This study is organized into three parts. Chapter Two completes Part I by providing a history of the development of the exporter cartel and the importer cooperative in the market. In Part II a theoretical interpretation of an economic cartel of oil exporters is formulated (Chapter Three), the movement toward nationalization is described (Chapter Four), and the implications of this nationalization on the behavior of the export cartel are deduced (Chapter Five). Part III contains a description of the proposed policy of the import cooperative (Chapter Six) and an enumeration of the logical impact of such policies on the world price as unilaterally determined by the nationalizing export cartel (Chapter Seven). A summary of major insights concludes the study (Chapter Eight).
The main conclusion of the study is that nationalization and importer coordination have the potential to undermine the ability of the export cartel to sustain the current real price of oil in the world market. Political amplification of an asymmetrical loss inflicted on different members of the seller group by the prospective entry of energy alternatives and sovereignty objections to the implementation of a limit pricing strategy that would block that entry loss are the major findings that support this conclusion. Largely because of continuing uncertainty about the direction and vigor of policy reactions by major importers, the finding of the potential for a price drop cannot be advanced as a prediction of an impending price drop. Nevertheless, the contribution of this study is the demonstration that the explicit consideration of nationalization and importer coordination weakens support for the assumption that world oil prices will remain at or above their current real level.
CHAPTER TWO

RECENT DEVELOPMENTS IN THE WORLD OIL MARKET

The Organization of Petroleum Exporting Countries (OPEC) is the crude oil-exporting cartel that sets the world oil prices. This cartel of oil producers consists of seven Arab countries (Iraq, Kuwait, Qatar, Saudi Arabia, the United Arab Emirates or the U.A.E., Algeria, and Libya) in the Middle East, and six other countries spread over four continents (Iran, Nigeria, Venezuela, Indonesia, Ecuador, and Gabon).\(^1\) In the mid-1970's these thirteen countries together accounted for over 90 per cent of the oil exports, 66 per cent of the crude oil production, and 80 per cent of the proven reserves in the noncommunist world.\(^2\)

The purpose of this chapter is to review some of the important events that laid a foundation for the emergence of the OPEC nations in the early 1970's as the dominant element in the level of the world price of oil. One of those events was the absence of a joint energy policy among governments in major oil-importing countries. As a belated remedy, the International Energy Agency (IEA) evolved

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\(^1\) The term "Middle East members" will be used throughout this paper to refer to the OPEC producers located around the Persian Gulf and in North Africa. This group includes the seven Arab producers and Iran.

\(^2\) Ecuador and Gabon are an empirically insignificant component of OPEC, since together they contribute just over one per cent of the group's aggregate oil production. It may be more accurate, therefore, to conceive of this as an eleven member cartel.
as the instrument through which major oil-importing nations have begun to coordinate energy policies. As should become evident in the following discussion, the interaction of several forces provided an unusually favorable opportunity for the success of a supply side coalition by oil-exporter governments at the particular time that it occurred.

A. The Changing Role of Payments to Governments in International Crude Oil Prices

Exploration and production costs have been the smallest component in the price of crude oil from OPEC, and particularly Middle East deposits, for the entire post World War II period. For instance, Exxon has published data which indicate that, of a typical sales price for Middle East crude oil of $2.05 per barrel in 1948, only $0.60 was needed to cover these operating costs. Similar figures for 1960 were a $1.80 price and a 20¢ cost, for 1970 a $1.40 price and a 10¢ cost and for 1975 a $11.50 price and a 25¢ cost. Due to less fortunate geological circumstances, costs are much higher in other parts of the world. Since oil of the same quality obtains uniform f.o.b. prices in free world trade, Middle East crudes have long offered their owners an enormous windfall profit. The history of the international oil industry from 1945 through 1973 has been characterized by the Iranian Oil Minister

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3Exxon Public Affairs Department, Middle East Oil, (New York: Exxon Corp., August, 1976), p. 15. A more detailed explanation of cost is developed in Chapter Three.
as a series of maneuvers by the oil-exporting countries and the
producing companies to divide this profit. This period of
jockeying can be separated into four phases reflecting the pro-
gressive growth in the host government share.

1. Phases of International Oil Relations

During the early post-war years the producing companies paid
either a fixed royalty per barrel or a small portion of their
total profits under a profit sharing agreement to the host govern-
ments. Exxon data indicate that the profit split during this first
phase was approximately 20 per cent to the host governments and 80
per cent to the companies. Nominal 50/50 profit splitting replaced
these small, but stable government payments in Venezuela in 1948,
and in Saudi Arabia and the rest of the Middle East in the early
1950's. The sales price at which oil moved in this second phase
remained close to the posted price on which tax payments to the
host governments were computed until 1959 and early 1960. An excess
supply of crude oil then developed in the world market with the
resumption of short haul shipments to Europe from the Persian Gulf,
following the Suez crisis of 1957 and the U.S. adoption of an import
quota in 1959. The resulting fall in market price came completely

4 Jahangir Amouzezer, "The Oil Story: Facts, Fiction, and Fair

5 James T. Jensen, "International Oil-Shortage, Cartel or
Emerging Natural Monopoly?" Vanderbilt Journal of Transnational
Law, Vol. 7, No. 2 (Spring, 1974), pp. 335-80. Except as otherwise
noted the rest of this section is summarized from this source.
out of the companies' profit portion. In an attempt to share the effects of what appeared to be a prolonged deterioration in price, the companies reduced the tax reference or posted price in August, 1960.

The beginning of the third phase came in September, 1960 when government officials from five leading oil-exporting countries — Saudi Arabia, Venezuela, Iran, Iraq, and Kuwait — established the Organization of Petroleum Countries (OPEC). Its purpose was to work for the stabilization of oil prices, the unification of the group's oil policies, and the collective enhancement of the oil revenues of the members. Posted prices were stabilized and over the entire decade of the 1960's these countries gradually improved their 50 per cent share of the profits. In 1962-63 "royalty expensing" (treating royalties as a deduction from gross income like production cost, rather than as a credit against tax payments) increased the government take to 56.25 per cent of net income from oil production. A 1965 OPEC agreement to uniformly tax on the full posted price of all oil, rather than on pre-arranged allowances off posted prices, further increased the host country share. By 1970 this split had reached about 75/25 as market prices slipped well below the stabilized posted prices.

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Table 2-1 reflects this gradual gain in the average per barrel government revenue for OPEC's charter members. The amounts quoted are in nominal dollars, and on the average this take increased by about 6 per cent between 1959 and 1969. Total nominal oil revenue for these governments increased by 111 per cent in this decade mainly because their export volumes increased by 105 per cent. Over the same period the purchasing power of the U. S. dollar (as measured by the implicit GNP price deflator of the U. S. Commerce Department) declined by 26 per cent. This deflator is not the ideal measure of OPEC purchasing power, but, as will be shown below, it is probably a good approximation for this period.

In September, 1970 the Libyan government won an agreement from the companies to increase the posted prices of its oil. This event initiated a fourth phase since it marked the first time that any OPEC country had ever succeeded in forcing the international oil companies to accept an increase in the tax reference price of its crude oil. The companies had always determined the posted price before this juncture. At subsequent price conferences in Teheran in January, 1971 and in Tripoli in February, 1971, the major producing countries of the Persian Gulf and North Africa won substantial tax rate and posted price increases from the companies. Conference agreements set the tax reference prices about 40 per cent above the then existing market prices. This arrangement had the effect of setting the profit split at 80/20 in the countries'
<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Saudi Arabia</td>
<td>$0.758</td>
<td>$0.750</td>
<td>$0.755</td>
<td>$0.765</td>
<td>$0.787</td>
<td>$0.820</td>
<td>$0.832</td>
<td>$0.834</td>
<td>$0.848</td>
<td>$0.878</td>
<td>$0.871</td>
</tr>
<tr>
<td>Kuwait</td>
<td>0.778</td>
<td>0.764</td>
<td>0.744</td>
<td>0.748</td>
<td>0.743</td>
<td>0.769</td>
<td>0.789</td>
<td>0.784</td>
<td>0.793</td>
<td>0.805</td>
<td>0.808</td>
</tr>
<tr>
<td>Iran</td>
<td>0.836</td>
<td>0.801</td>
<td>0.758</td>
<td>0.745</td>
<td>0.797</td>
<td>0.809</td>
<td>0.811</td>
<td>0.814</td>
<td>0.825</td>
<td>0.837</td>
<td>0.810</td>
</tr>
<tr>
<td>Iraq</td>
<td>0.824</td>
<td>0.786</td>
<td>0.765</td>
<td>0.767</td>
<td>0.807</td>
<td>0.801</td>
<td>0.817</td>
<td>0.813</td>
<td>0.852</td>
<td>0.907</td>
<td>0.914</td>
</tr>
<tr>
<td>Venezuela</td>
<td>0.984</td>
<td>0.892</td>
<td>0.930</td>
<td>0.972</td>
<td>0.986</td>
<td>0.954</td>
<td>0.956</td>
<td>0.958</td>
<td>1.022</td>
<td>1.014</td>
<td>1.035</td>
</tr>
</tbody>
</table>

favor. These agreements also set out a schedule for the escalation of tax rates up until 1976. Further, in December, 1972 several Persian Gulf states began "participation" in the operations of their concessionaire companies. As will be explained in more detail in Chapter Four, these agreements had the same type of effect as the "royalty expensing" and "uniform tax" agreements of the 1960's — that of increasing the countries' tax take without changing royalty, tax, or posted price levels.

A series of changes in the assumptions upon which the 1971 price agreements were based, however, led to a demand by the host countries for complete renegotiation in the fall of 1973. Unforeseen changes included two devaluations of the U. S. dollar (the currency in which oil prices were listed), the slow progress of local government takeover of oil operations ("participation"), and the surge in U. S. import demand (particularly after the ending of mandatory import restrictions in April, 1973). The effect of these occurrences was to erode the host governments' share of oil profits from 80 per cent to 64 per cent in less than two years.

New negotiations over the adjusted 1971 terms convened coincidentally with the beginning of the Arab–Israeli War of 1973. The

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8 Small adjustments in the original agreements had been negotiated in January 1972 and June 1973 in response to these devaluations.

9 Penrose, op. cit.
company negotiators balked at the large posted price increase immediately demanded by the host governments. In an emotional response, the Arab ministers renounced the procedure of negotiating prices and taxes with the companies, and overnight they unilaterally raised the posted price of a barrel of the group's benchmark or marker crude oil from $3.01 to $5.12. In addition, output and destination restrictions were imposed by the Arab countries on October 27, 1973. This embargo was aimed more at supporting the war effort against Israel than at supporting the new price policy. However, it quickly elicited bids of up to $20 per barrel for top quality Nigerian and Libyan crude oil. As a result of free market prices of these magnitudes, the OPEC nations jumped tax reference prices to the $11 to $12 per barrel range at the beginning of 1974. The panic bidding in late 1973 demonstrated how easily the producing countries could enforce their unilaterally set price, and how well they could prosper without benefit of the companies' marketing expertise. Since that learning experience, the countries have retained exclusive price control. Complete elimination of the companies from crude oil pricing may be considered a fifth phase in the post-war company-country relations.

2. OPEC's Trading Gain

The recent success of this cartel in its ultimate aim of increasing government oil revenues is reflected in Tables 2-2 and 2-3, which estimate oil receipts on a per barrel basis and on a total basis, respectively, for the eleven main OPEC members during
### TABLE 2-2

ESTIMATED GOVERNMENT REVENUE PER BARREL OF EXPORTS FOR THE MAIN OPEC MEMBERS (current US Dollars)

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Saudi Arabia</td>
<td>0.883</td>
<td>1.259</td>
<td>1.437</td>
<td>1.567</td>
<td>7.284</td>
<td>9.948</td>
</tr>
<tr>
<td>Kuwait</td>
<td>0.828</td>
<td>1.203</td>
<td>1.360</td>
<td>1.706</td>
<td>7.462</td>
<td>10.027</td>
</tr>
<tr>
<td>Iran</td>
<td>0.862</td>
<td>1.246</td>
<td>1.358</td>
<td>2.080</td>
<td>8.719</td>
<td>10.137</td>
</tr>
<tr>
<td>Iraq</td>
<td>0.957</td>
<td>1.415</td>
<td>1.507</td>
<td>2.759</td>
<td>8.906</td>
<td>9.554</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>0.920</td>
<td>1.272</td>
<td>1.434</td>
<td>1.619</td>
<td>9.166</td>
<td>9.967</td>
</tr>
<tr>
<td>Qatar</td>
<td>0.915</td>
<td>1.264</td>
<td>1.445</td>
<td>1.966</td>
<td>8.421</td>
<td>10.625</td>
</tr>
<tr>
<td>Libya</td>
<td>1.090</td>
<td>1.786</td>
<td>1.966</td>
<td>2.897</td>
<td>11.029</td>
<td>9.605</td>
</tr>
<tr>
<td>Algeria</td>
<td>0.907</td>
<td>1.268</td>
<td>1.877</td>
<td>2.426</td>
<td>10.482</td>
<td>10.196</td>
</tr>
<tr>
<td>Nigeria</td>
<td>1.093</td>
<td>1.722</td>
<td>1.870</td>
<td>2.997</td>
<td>11.069</td>
<td>10.563</td>
</tr>
<tr>
<td>Venezuela</td>
<td>1.092</td>
<td>1.411</td>
<td>1.719</td>
<td>2.330</td>
<td>8.709</td>
<td>9.610</td>
</tr>
<tr>
<td>Indonesia</td>
<td>0.693</td>
<td>1.040</td>
<td>1.243</td>
<td>2.568</td>
<td>8.707</td>
<td>10.606</td>
</tr>
<tr>
<td>Average all countries</td>
<td>$0.946</td>
<td>$1.353</td>
<td>$1.565</td>
<td>$2.265</td>
<td>$9.087</td>
<td>$10.085</td>
</tr>
</tbody>
</table>

### TABLE 2-3

**ESTIMATED GOVERNMENT OIL REVENUES FOR THE MAIN OPEC MEMBERS**

* (million US Dollars)

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Saudi Arabia</td>
<td>$1,200</td>
<td>$2,149</td>
<td>$3,107</td>
<td>$4,340</td>
<td>$22,574</td>
<td>$25,676</td>
</tr>
<tr>
<td>Kuwait</td>
<td>895</td>
<td>1,400</td>
<td>1,657</td>
<td>1,900</td>
<td>7,000</td>
<td>7,500</td>
</tr>
<tr>
<td>Iran</td>
<td>1,136</td>
<td>1,944</td>
<td>2,380</td>
<td>4,100</td>
<td>17,500</td>
<td>18,500</td>
</tr>
<tr>
<td>Iraq</td>
<td>521</td>
<td>840</td>
<td>575</td>
<td>1,843</td>
<td>5,700</td>
<td>7,500</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>233</td>
<td>431</td>
<td>551</td>
<td>900</td>
<td>5,536</td>
<td>6,000</td>
</tr>
<tr>
<td>Qatar</td>
<td>122</td>
<td>198</td>
<td>255</td>
<td>409</td>
<td>1,600</td>
<td>1,700</td>
</tr>
<tr>
<td>Libya</td>
<td>1,295</td>
<td>1,766</td>
<td>1,598</td>
<td>2,300</td>
<td>6,000</td>
<td>5,100</td>
</tr>
<tr>
<td>Algeria</td>
<td>325</td>
<td>350</td>
<td>700</td>
<td>900</td>
<td>3,700</td>
<td>3,375</td>
</tr>
<tr>
<td>Nigeria</td>
<td>411</td>
<td>915</td>
<td>1,174</td>
<td>2,200</td>
<td>8,900</td>
<td>6,570</td>
</tr>
<tr>
<td>Venezuela</td>
<td>1,406</td>
<td>1,702</td>
<td>1,948</td>
<td>2,670</td>
<td>8,700</td>
<td>7,525</td>
</tr>
<tr>
<td>Indonesia</td>
<td>185</td>
<td>284</td>
<td>429</td>
<td>950</td>
<td>3,300</td>
<td>3,850</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7,729</strong></td>
<td><strong>11,979</strong></td>
<td><strong>14,374</strong></td>
<td><strong>22,512</strong></td>
<td><strong>90,510</strong></td>
<td><strong>93,296</strong></td>
</tr>
</tbody>
</table>

the 1970-75 period. The figures in Table 2-2, like those in Table 2-1, are average figures for each country. Over this six year period the 1,107 per cent average increase in oil revenue for OPEC governments has come largely from a 964 per cent increase in per barrel receipts. Both tables show dollar figures unadjusted for inflation. The most often repeated justification by OPEC leaders for this huge increase is that there has been comparable inflation in the price of goods they import from the industrialized world.

In an effort to empirically test this assertion, two economists in the U. S. Bureau of Labor Statistics have developed indices to measure the purchasing power of OPEC revenue per barrel of oil vis-a-vis commodity exports from the U. S. to OPEC. Their figures cover the period June 1964 to June 1975 and show that, while OPEC revenue per barrel increased by 930 per cent, the price of U. S. exports to OPEC increased by only 78.3 per cent. Periodic levels of this index of prices paid by OPEC nations are shown in Figure 2-1 with the line labeled MPLDFL.

Three shortcomings in the construction of this index limit, but probably do not completely invalidate, its use to indicate the approximate size of the price increases with which OPEC nations have been confronted. Military exports to OPEC are not included; these are purchases which are probably significant for at least Iran.

FIGURE 2-1
PRICE INDICES FOR U. S. COMMODITIES BOUGHT BY OPEC COUNTRIES
(1967 = 100)

Price Level

180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0

6-64 6-65 6-66 6-67 6-68 6-69 6-70 6-71 6-72 6-73 6-74 6-75

(b)

and Saudi Arabia. The value of exports to OPEC from industrial countries other than the U. S. are not used; in 1973 these made up 78 per cent of the total value of exports by the Organization for Economic Cooperation and Development (OECD) to OPEC. Finally, the MPLDFL index only includes commodity imports by OPEC nations; this leaves out service imports which probably are significant for these developing countries.

With no data available on price changes for military goods or for non-U. S. goods bought by OPEC, there is no way to judge whether the MPLDFL index is biased up or down due to those omissions. Commerce Department data, however, do indicate that the inflation rate has been higher for the prices of services than it was for durable and non-durable goods. As a rough adjustment for this omission, the Commerce Departments price deflator for U. S. exports of goods and services for the 1964 through 1975 period is depicted in Figure 2-1 with the line labeled XPDFL.\textsuperscript{11} If military exports and non-U. S. exports to OPEC have not experienced widely different rates of inflation than have U. S. nonmilitary exports, and if OPEC buys various services in about the same proportion as is used to construct the XPDFL index, the loss of purchasing power by OPEC due to inflation is somewhere between the two export lines in Figure 2.1. Even with this upward adjustment, OPEC per barrel revenues have

\textsuperscript{11}Since the components of this index are not weighted for the distribution by type of U. S. service exports to OPEC, this is less exact than the MPLDFL index, which does employ this weighting for commodity exports to OPEC.
risen much more (930 per cent) than the prices they appear to pay for their imports (probably no more than 110 per cent). That oil-exporters' purchasing power has increased considerably appears indisputable. In 1975 a barrel of oil bought on the order of five times what it did eleven years earlier.

Note, the implicit GNP price deflator for the U. S. (GNPDEFL in Figure 2-1) is close to the two export indices up through the middle of 1968, is above these from then to the middle of 1973, and below them after that. As such, it seems to provide an adequate base to gauge the change in OPEC purchasing power up to about the end of the 1960's. The recent volatility of these indices, depicted in Figure 2-1b with shorter time intervals than used in panel a, indicate that the general indices for dollar priced goods have provided less accurate measures of the purchasing power of petrodollars since 1973.

B. Market Circumstances Behind OPEC's Success

These impressive real gains by OPEC, especially in the last three years, reflect far more than its ability to take more and more of the windfall profit from the international oil companies. OPEC has been able to push up the price of crude oil and increase the size of this windfall profit to a much greater degree than was ever done before 1973. Several factors have been identified, through hindsight, as responsible for this impressive performance by OPEC.
1. Tightening World Oil Market

One factor that allowed those who controlled OPEC oil to increase its selling price was the end of the surplus conditions that had for so long prevailed in the world market for crude oil. Three parallel developments seem principally responsible for the stiffening of the demand for OPEC-sited crude oil; (1) a rapid growth of world energy consumption as a whole, (2) a cumulative shift in energy consumption towards oil, and (3) the rising volume of U. S. oil imports. Underestimation of the extent of these changes that served to geographically concentrate a lot of market power was characteristic of a succession of energy predictions that appeared between 1960 and 1972.\footnote{Joel Darmstadter and Han H. Lansbert, "The Oil Crisis: In Perspective; The Economic Background," \textit{Daedalus}, Vol. CIV, No. 4 (Fall, 1975), p. 22.} Had the oil consumer nations recognized the magnitude of these shifts and correctly analyzed their significance, remedial and cushioning measures might have been taken before the sudden price change that occurred in 1973-1974.

Between 1960 and 1972 overall world energy consumption grew at an average annual rate of 5 1/2 per cent or from the equivalent of 60.5 million barrels per day (MBD) of oil, to the equivalent of 115.7 MBD of oil. A major factor in this increase was income growth, with the energy consumption/real GNP elasticity roughly equal to unity for the major consuming regions and somewhat above...
unity elsewhere. In the 12 month period just before October, 1973 there was a coincidence of boom conditions in Europe, Japan, and the U. S., as real GNP grew at 5.4 per cent, 10.4 per cent, and 5.9 per cent, respectively. The consequence was a parallel surge in energy demand in all major consuming areas at this one time.

Between 1960 and 1972 the share of oil in total energy consumption increased from 35.8 per cent to 46 per cent, or from 21.7 MBD to 53.2 MBD. The key factor in this shift was the fall in the real price of oil. Petroleum prices in January, 1969, relative to the prices for other products at wholesale, was roughly 10 per cent lower than it had been eleven years earlier. Some government policies reinforced this shift to greater dependence on oil. For instance, during the 1950's and 1960's, the European Coal and Steel Community held the price of coal down to no more than 5 per cent of industrial cost (with the purpose of enhancing the competitive position of European industry in international markets). An ensuing relative decline in coal supplying capacity (as coal profits were held down) was compensated for by an increase in the use of fuel oil. In the U. S. the relative demand for oil

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15 Romano Prodi and Alberto Clo, "Europe," Daedalus, Vol. CIV, No. 4 (Fall, 1975), p. 93. The oil companies actively penetrated
expanded after 1970 as a combined result of: (1) a leveling off of natural gas output; (2) environmental constraints that reduced power station coal use; (3) technical, safety, and financial delays in the spread of nuclear power; and (4) an acceleration in petroleum demand in the transport sector.\(^16\)

After being constant (as a per cent of consumption) for the early and mid-1960's, U. S. oil imports jumped from 19 per cent in 1967 to 35 per cent in 1973. Behind this result was the fact that while oil demand was surging in this period, U. S. crude oil production leveled off, and actually fell from 4.07 billion barrels in 1970, to 3.93 billion barrels in 1973.\(^17\) Increased U. S. reliance on oil imports was significant for Europe and Japan as well as for the U. S., since it signaled the end of the ability of the U. S. to serve as a standby producer during a disruption in world oil flows. For instance, spare crude oil producing capacity in the U. S. stood at around 25 per cent at the beginning of the oil supply disruptions.

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\(^{16}\) McKie, \textit{op. cit.}, pp. 74-76.

\(^{17}\) Darmstadter and Landsbert, \textit{op. cit.}, p. 30. This decline along with a parallel decline in total proven reserves is traced to lagging investment by the oil industry in the U. S. They cite figures estimating that capital spending on exploration and development in this country increased by only about 90 per cent in current dollars between 1963 and 1973 (with much of it being for offshore lease acquisitions), while the same statistic showed an increase of 230 per cent in the rest of the world for the same period, p. 34.
in both 1956-57 and 1967, but only at 10 per cent in 1973. When compared with the greater import dependence of the U. S. in 1973, the ability of American supplies to cushion an oil disruption in 1973 was considerably reduced.

With only minor export capacity available from other countries that produced crude oil, the above three factors supported other conditions that permitted monopolistic behavior by those who controlled production, reserves, and exports of the OPEC nations. The surge in energy (and especially oil) demand came at a time when alternative oil and energy sources were either fully occupied or had unexpectedly failed to materialize. In order for the host countries to exercise this monopoly potential, the OPEC governments had to wrest control of the pricing of their oil from the multinational oil companies that actually produced and sold it.

2. Role of Independents

A development which provided the leverage for this change in control was the rise in importance of the "independents" in the world oil market. "Independent" is the term applied to any large

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18 Ibid., p. 30. A coincident development which aggrevated the vulnerability of Europe was the fact that crude oil and petroleum product inventories fell by one-third between 1971 and the end of the third quarter of 1973. Ibid., p. 27. A similar experience in the U. S. made importers in these two key consuming areas more than usually dependent on current arrivals of crude oil, and undoubtedly contributed to the panic and unheard of price bids in later 1973.

19 This is a major point developed by Neil H. Jacoby in his analysis of the world oil market: Multinational Oil (New York: MacMillan, 1974). He estimates that between 1953 and 1972 some 350
oil company not in the group that was operating in the Middle East at the end of the second world war. This original group -- the "multinationals," "majors," or "seven (later eight) sisters" -- included Exxon, Mobil, California Standard (So Cal), Texaco, Gulf, British Petroleum (BP), Royal Dutch/Shell, and Compagnie Francoise des Petroles (CFP). The term independent is derived from the fact that the international oil companies other than these eight depended on outside (the company) supplies for more than 70 per cent of their oil -- they were independent of their major sources.

The extraordinary cheapness of oil from the Middle East attracted these "independents," who began developing their own sources of this crude oil in 1954. George Stocking quotes detailed estimates of the magnitude of the cost advantage enjoyed by crude oil lifted from this area over that lifted elsewhere in the world. The most crucial effect of this circumstance is that the "independents" felt they could not compete without their own access to it. Unlike the "majors," the holdings of individual "independents" were concentrated in one producing country and constituted a much larger proportion of the aggregate supplies of the individual company. Thus, one country had the ability to shut off the only source of cheap oil supply available to "independents."

Separate oil companies entered or expanded into the international oil industry, principally in OPEC territory.

That leverage was exercised in the summer of 1970. The Suez Canal had been closed since 1967. In May, 1970 the Syrians cut the Trans Arabian Pipeline, interrupting the only other short haul tanker route from the Persian Gulf to Europe. Thus insulated from undercutting by increased shipments of Persian Gulf crude, Libya, the sole major source of cheap crude still with direct access to the Mediterranean, began selective cutbacks on its crude oil production in the name of conservation. These cutbacks fell most heavily on the operations of the "independents," who had neither offsetting Persian Gulf production of their own to substitute on their sales contracts nor access to enough tanker bottoms to get Middle East oil around Africa to Europe. When the "majors," with their diversified sources, were unable or unwilling to come to the aid of the "independents," the latter caved in and agreed to Libyan demands for tax rate and posted price increases. The majors had to match these terms in Libya and in early 1971 and were forced to grant comparable terms in the Persian Gulf to protect their access to a diversified source of low cost crude oil.  

The role of these particularly favorable market circumstances in OPEC's success was reinforced by inaction and mutual distrust by the governments in its leading customer countries.

\[21\] For a detailed treatment of this bargaining pattern see the articles by Raymond Vernon, Edith Penrose, and Mira Wilkens in Daedalus, Vol. CIV, No. 4 (Fall, 1975); and Anthony Sampson, The Seven Sisters (New York: Viking Press, Inc., 1975), Chapters 7 and 10; and Jensen, op. cit.
G. Joint Consumer Country Response to OPEC

The major oil-importer countries had managed to weather early oil emergencies with fair success. This success was probably due more to the fortuitous circumstances they enjoyed than to any effective response by importers as a group, however.

1. Early International Cooperation

During the 1956 Suez crisis, oil flows to Western Europe were interrupted, and the Organization for European Economic Cooperation (OEEC), the predecessor of the OECD, managed to allocate the reduced supply of oil among its members. The U. S. and Japan were not part of the system, and the U. S. provided vital support by calling on reserve oil production capacity to help Europe. This performance occurred in a period long before the U. S. had become dependent on Eastern Hemisphere imports for some of its own needs.

In 1967 an attempted Arab oil embargo against the U. S. and Britain fizzled before the OECD had time to invoke emergency allocation measures. However, even this ineffective embargo raised strong objections by some European nations to the idea of Western governments rerouting tankers. Officials expressed the fear that such action might offend the Arabs. Efforts as late as 1972 and 1973 to develop an OECD emergency allocation system failed, when the U. S. refused to commit its domestic production to such a

sharing scheme, and when Japan refused to join an agreement without such a commitment.

One show of unity on oil matters by the major oil-importer countries may have worked to paralyze joint resistance to OPEC in a period before the members of the latter became confident of their dominance in the oil market. In January, 1971 at an OECD meeting in Paris, the oil companies, with the aid of the U. S. State Department, persuaded the assembled governments not to oppose the increase in petroleum product prices that would result from the recent tax increase imposed by Libya and likely to be matched at the coming Teheran and Tripoli meetings. Professor M. A. Adelman argues that this advance capitulation to anticipated OPEC price demands did much to encourage the subsequent boldness on the part of the oil-exporters. 23 OPEC threats to use its oil weapon gained credibility with the assurance that consumer governments would not object.

2. Response to the Oil Crisis

When oil was withheld in October of 1973, the consumer countries were able to do little about it. Selective cutbacks imposed by the Arab oil exporters on some but not all European nations effectively paralyzed any joint action by the European Economic Community (EEC). The Project Independence discussions

23 "Is the Oil Shortage Real? Oil Companies as OPEC Tax Collectors," Foreign Policy, No. 9 (Winter 1972-73).
in the U. S. further divided the consumer countries in the face of OPEC unity. None of the other OECD countries had, at that time, any domestic prospects for alternatives to OPEC oil. With time, however, the recognition of their interdependence led to a desire to cooperate on oil matters by most of the OECD countries. To explore ways to try to reduce their energy vulnerability, several industrial nations attended the Washington Energy Conference in February, 1974.

This conference led to the establishment of the Energy Coordination Group (ECG) composed of the U. S., Japan, Canada, Norway, and eight of the nine EEC members. France refused to join, preferring instead to pursue bilateral, national oil deals. Two factors seemed primary in this split between France and its EEC partners. One, unlike the other Europeans, the French insisted on not endorsing the central position of U. S. based oil companies in the world market which close cooperation with the U. S. would have appeared to do. Two, the French alone felt that a unified approach by major oil consuming countries was not the best way to handle the threatening situation.

The U. S. strategy during the ECG tenure seemed to have two components. First, the ECG was pressed to devise a comprehensive framework for consumer country cooperation, including an oil-sharing scheme to be used in emergencies. Second, while berating attempts by individual consuming countries to strike bilateral bargains with oil producing countries, a vigorous attempt was made to persuade King Faisal of Saudi Arabia to stop supporting the high cartel price
of oil. By November, 1974 this solitary U. S. effort was apparently abandoned as fruitless, and the ECG countries drafted an International Energy Program (IEP). Several other nations promptly adhered to it.

The IEA was provisionally established by sixteen nations in November, 1974. In February, 1975 New Zealand joined as the seventeenth full member and Norway joined as an associate member. Greece became an associate member in May, 1976. Participation in the IEA is open to all OECD countries and to European Communities that wish to join and are willing and able to meet the Agreement’s requirements.

Table 2-4 provides information on the members and potential members of the IEA. Note the degree of dependence on oil imports reflected for most of these countries in the last column ratio.24

Table 2-5 indicates the IEA’s relative importance in the oil world at the time of its inception. Again note the vulnerability portrayed in the percentage columns. The countries in the IEA typically

24The production from the North Sea and Alaskan fields will substantially alter these figures for the U. S., the U. K., and Norway, but not until late 1977 at the earliest. Industry estimates that the trans-Alaska pipeline will have a first stage capacity of 1.2 MBD by late 1977, and a full stage capacity of 1.6 MBD in 1979, on a base of 9.6 billion barrels of proved reserves in the Alaskan North Slope.

<table>
<thead>
<tr>
<th>OECD Members a (24)</th>
<th>ECG Members (12)</th>
<th>IEA Members (19)</th>
<th>1976 Oil Consumption d (1000 m.t.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td></td>
<td></td>
<td>28,020/19,452</td>
</tr>
<tr>
<td>Austria</td>
<td>Austria</td>
<td></td>
<td>9,319/ 1,931</td>
</tr>
<tr>
<td>Belgium b</td>
<td>Belgium</td>
<td>Belgium</td>
<td>29,371/0</td>
</tr>
<tr>
<td>Canada</td>
<td>Canada</td>
<td>Canada</td>
<td>84,569/71,160</td>
</tr>
<tr>
<td>Denmark b</td>
<td>Denmark</td>
<td>Denmark</td>
<td>8,215/194</td>
</tr>
<tr>
<td>Finland</td>
<td></td>
<td></td>
<td>10,982/0</td>
</tr>
<tr>
<td>France b</td>
<td></td>
<td></td>
<td>121,902/1,057</td>
</tr>
<tr>
<td>W. Germany b</td>
<td>W. Germany</td>
<td>W. Germany</td>
<td>109,987/5,524</td>
</tr>
<tr>
<td>Greece</td>
<td>Greece c</td>
<td></td>
<td>11,059/0</td>
</tr>
<tr>
<td>Iceland</td>
<td></td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td>Ireland b</td>
<td>Ireland</td>
<td>Ireland</td>
<td>1,944/0</td>
</tr>
<tr>
<td>Italy b</td>
<td>Italy</td>
<td>Italy</td>
<td>105,975/1,102</td>
</tr>
<tr>
<td>Japan</td>
<td>Japan</td>
<td>Japan</td>
<td>227,950/576</td>
</tr>
<tr>
<td>Luxembourg b</td>
<td>Luxembourg</td>
<td>Luxembourg</td>
<td>*</td>
</tr>
<tr>
<td>Netherlands b</td>
<td>Netherlands</td>
<td>Netherlands</td>
<td>64,907/1,371</td>
</tr>
<tr>
<td>New Zealand</td>
<td></td>
<td>New Zealand</td>
<td>3,517/477</td>
</tr>
<tr>
<td>Norway</td>
<td>Norway c</td>
<td>Norway</td>
<td>8,458/13,828</td>
</tr>
<tr>
<td>Portugal</td>
<td></td>
<td></td>
<td>5,769/0</td>
</tr>
<tr>
<td>Spain</td>
<td>Spain</td>
<td></td>
<td>50,448/1,772</td>
</tr>
</tbody>
</table>
### TABLE 2-4—CONTINUED

<table>
<thead>
<tr>
<th>OECD Members&lt;sup&gt;a&lt;/sup&gt; (24)</th>
<th>ECG Members (12)</th>
<th>IEA Members (19)</th>
<th>1976 Oil Consumption&lt;sup&gt;d&lt;/sup&gt; Production (1000 m.t.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>Sweden</td>
<td></td>
<td>14,788/3</td>
</tr>
<tr>
<td>Switzerland</td>
<td>Switzerland</td>
<td></td>
<td>4,911/0</td>
</tr>
<tr>
<td>Turkey</td>
<td>Turkey</td>
<td></td>
<td>13,487/2,595</td>
</tr>
<tr>
<td>United Kingdom&lt;sup&gt;b&lt;/sup&gt;</td>
<td>United Kingdom</td>
<td>United Kingdom</td>
<td>97,784/11,765</td>
</tr>
<tr>
<td>United States</td>
<td>United States</td>
<td>United States</td>
<td>697,522/400,605</td>
</tr>
</tbody>
</table>

Sources:  

<sup>a</sup>Yugoslavia is a "special status" member of OECD.

<sup>b</sup>European Economic Community members.

<sup>c</sup>Associate members, meaning that they are not part of the IEA emergency sharing plan that is explained in Chapter Six.

<sup>d</sup>Refinery intake of crude oil or semi-processed feedstocks.

*Included with the figures for Belgium.
### TABLE 2-5

**RELATIVE SIZE OF IEA IN THE WORLD OIL MARKET (1976)**

<table>
<thead>
<tr>
<th>Group</th>
<th>Oil Consumption (1000 m.t.)</th>
<th>% of World</th>
<th>Oil Production (1000 m.t.)</th>
<th>% of World</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEA</td>
<td>1,542,267</td>
<td>52.3</td>
<td>513,960</td>
<td>17.1</td>
</tr>
<tr>
<td>OECD</td>
<td>1,710,884</td>
<td>58.0</td>
<td>533,412</td>
<td>17.8</td>
</tr>
<tr>
<td>Non-Communist World</td>
<td>2,400,000</td>
<td>81.4</td>
<td>2,370,000</td>
<td>79.3</td>
</tr>
<tr>
<td>Communist World$^a$</td>
<td>550,000</td>
<td>18.6</td>
<td>620,000</td>
<td>20.7</td>
</tr>
<tr>
<td>World$^b$</td>
<td>2,950,000</td>
<td>100%</td>
<td>2,990,000</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Sources:**

$^a$Includes Albania, Bulgaria, China, Chile, Cuba, Czechoslovakia, East Germany, Hungary, North Korea, North Vietnam, Poland, Romania, U.S.S.R., and Yugoslavia.

$^b$The *International Economic Report of the President* reports world and communist world consumption and production figures in millions of barrels per day. To make these consistent with the IEA and OECD totals, a conversion factor of 1 million barrels per day equals 50 million metric tons per year was applied.
account for some 80 per cent of total world oil imports. Chapter Six presents a thorough discussion of the status of the several programs adopted by this consumer organization to reduce the collective vulnerability of its members.

D. Implications

The facts in this historical review suggest the following conclusions. The OPEC nations' success at increasing the real return from their oil resources over the first half of the 1970's has been impressive. Several cumulative changes in energy use patterns and in the structure of the international oil industry greatly facilitated this performance by OPEC. Previously announced intentions not to oppose oil price hikes and distrust of each other by the major oil-importing countries during the crisis situation of 1973-74, prevented an immediate joint response by these nations to OPEC. The realization of the ineffectiveness of individual import country countermeasures, with the possible exception of costly isolation measures by the U. S., has belatedly led to a multilateral response by most oil-important nations.

An assessment of the prospective effects of this response by importers can best be devised within the context of a general model of the stability of the current real price of oil. Since this price is set and maintained by the OPEC cartel, a model of cartel behavior and durability is the appropriate vehicle. Chapter Three begins the process of enumerating such a model by reviewing the economic strengths and weaknesses in the seller monopoly. Refining
that formulation to take account of nationalization is the task of the remainder of Part II.
PART II

OPEC, NATIONALIZATION, AND OIL PRICES
CHAPTER THREE

ECONOMIC FACTORS IN THE STRENGTH OF OPEC

A cartel has been broadly defined as an alliance of rival decision making units (firms) in which members retain their separate identities and separate control over their policies subject to the terms of the formal agreement. The collusion usually centers on the fixing of a uniform price (or price spectrum) and on specifying methods for maintaining that price such as assigning production quotas to all members. This covenant promises two complementary benefits to its adherents. One, it provides a way for firms without sufficient individual market power to earn greater than competitive profits. Two, it serves to reduce individual risks. Each firm is furnished with information and some assurance about what other firms in its industry (those that belong to the cartel) will do during unpredictable future changes in the market.

An agreement among independent rivals to hold price above a competitive level unavoidably introduces pressures which tend to break up the coalition. A cartel can end due to internal pressures caused by disagreement among the conspirators, price chiseling, and/or uncontrolled expansion in member capacity. Also, a cartel

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collapse can be precipitated by external pressures such as demand shrinkage, new supply sources, and/or (where the monopolized market is only national in scope and violates antitrust policy) government legal action. The success of the cartel group at overcoming these obstacles to monopoly collaboration is largely controlled by two factors. A perception by members of the benefits of coordinated versus independent responses to market circumstances is one key factor. Where this understanding of mutual benefits is insufficient, the comprehensiveness of the formal agreement, including in particular the severity of penalties levied on cheaters and the effectiveness of enforcement, is the second factor that determines the collusion's durability.

Members of OPEC have agreed to set their individual prices around a common benchmark level. No central agency assigns a price to each exporter. The heterogeneous nature of the product of the cartel (due to variations in such things as sulfur content, specific gravity, and location) prevents these exporters from settling on a single price for crude oil. This producer group has not yet been able to agree on the proper price differentials that crude oils from different origins should bear. Individual oil exporters retain the legal right within the agreement to alter their relative prices and relative output shares.

To date the OPEC cartel has no known prorationing or formal quota scheme to insure that the output of members is consistent with
the established price. Instead, these nations appear to have implicitly agreed to accept the way that international oil companies limit production to what they can sell at the prescribed price and allocate this amount among the producing countries. Since the oil-exporting nations transfer the great bulk of their oil to the companies at a fixed price, the market share of each country depends upon what its resident companies can sell. Because company margins are very thin, processors cannot make significant price cuts. As long as no country makes lower offers to obtain more output, the market clears at the prevailing price. There appears to be no formal system within the cartel to respond to cheating behavior should, say, financial pressures tempt some members to chisel on the group price, although implicit political pressures probably can and have been used.3

The task of this and the following two chapters is to develop an assessment of the basic cohesiveness of the OPEC group by examining some incentives for independent and for concordant pricing

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2This deficiency means that OPEC is not an export cartel as defined by the Webb-Pomerene Act of the U. S. Congress.

3One general criticism of the oil market models reviewed in the article by D. Fischer, D. Gately, and J. F. Kyle, "The Prospects for OPEC: A Critical Survey of Models of the World Oil Market," Journal of Development Economics, Vol. II (December, 1975), pp. 363-86 is that these models contain no explicit analysis of OPEC stability. Rather the various authors tend to make only "intuitive assessments" that the excess capacity generated by various price paths either is or is not absorbable by the group. See in particular pages 378 and 380-81.
behavior that exist within that cartel. Chapter Three concentrates on an evaluation of what appear to be the primary economic factors in the stability that the oil exporters' cartel has demonstrated to date. The term economic is used in the study to identify elements which should effect the collusive conduct of managers who are assumed to act only so as to maximize the pecuniary profits or wealth of the owners of their respective firms. After Chapter Four reviews the evolution of nationalization, Chapter Five adds to this analysis of economic durability a discussion of the theoretical effects of political motives and international relations that are injected into this cartel when national governments come to own the member enterprises. This exercise should provide some insight into the general character and strength of "political-economic" cartels.

A. The Existence of Monopoly

In order for a study of cohesion and conduct for any cartel to be meaningful it must be assumed that the price in the relevant market is above the competitive level. In the market for a non-renewable resource the competitive price does increase, primarily as a result of increases in the scarcity value of the resource. A cartel arrangement would contribute to higher prices only by imposing price increases above those caused by increases in scarcity value. Conversely, price increases which cannot be explained in terms of scarcity values would support the assumption that a cartel
arrangement is present and effective in contributing to the prevailing price level.

Recent price increases in the world price or crude oil would not denote the operation of a monopoly if they can be traced to increases in the scarcity value (or opportunity cost) of oil. The scarcity value of crude oil is based on the fact that it is a nonrenewable mineral, meaning that its use is equivalent to spending out of stored-up treasure. If worldwide exhaustion of this treasure is eminent, then sellers could independently be led to the conclusion that a high price is simply compensating them for an impending loss of an income source and smoothing buyer transition to what replaces oil. Even though production costs may be very small for the marginal barrel of oil, there is a user cost that must be added to its current production and consumption to reflect the fact that it will not be available for use at a later date. This cost is the opportunity cost that today's seller bears for the oil he does not save. Should this full cost be at or close to $12 per barrel in 1976, then scarcity, not monopoly, is responsible for that price level. The decision about the true source of the $12 price level requires an empirical estimate of the scarcity value or opportunity cost of current oil production.

1. Components of a Full Cost Estimate

An attempt to calculate the opportunity cost of the marginal barrel to oil sellers involves the estimation of four parameters.
First, the level to which the price of a barrel of crude oil will eventually rise as a result of exhaustion must be predicted. The concept of a backstop technology is typically invoked to formulate a prediction about the future ceiling price for energy from oil.\(^4\) Assuming a backstop technology is feasible, let \(B_t\) represent the expected cost of providing the usable equivalent of a barrel of drilled oil in the form of a high cost more abundant substitute in the appropriate future period \(t\).\(^5\) Conventional oil that remains at time \(t\) could be sold by its holder for \(B\) dollars per barrel and no more.\(^6\)

\(^4\)The ceiling price determination is discussed by R. M. Solow in "The Economics of Resources or the Resources of Economics," American Economic Review, Vol. LXIV, No. 2 (May, 1974), pp. 1-14. He defines backstop technology as technology capable of substituting for a mineral resource at relatively high cost but on an effectively inexhaustible resource base. The breeder reactor or solar energy utilization constitute a backstop to fossil fuel. Technology using relatively more abundant natural resources such as coal, oil shale, or tar sands provides a limited backstop to drilled oil.

\(^5\)The clearest estimate of the ceiling price for crude oil \((B_t)\) is provided by estimates of the cost of synthetic petroleum from coal, shale, and tar sands (synfuel). When the backstop is based on a nonpetroleum fuel, a factor for the accompanying conversion of the energy producing and using capital stock must be added to the fuel price to obtain a ceiling price for oil that is based on the cost of the buyers' feasible alternative.

\(^6\)This \(B_t\) figure represents the ceiling price of oil only if the sales of the substitutes are not monopolized, as oil sales are herein asserted to be.
Second, the period or interval over which the reserve inventory of oil will last has an impact on the current scarcity value, and therefore must be estimated. The barrel of oil withheld today by a producer in anticipation of future benefits permits the sale of a barrel which would not be available otherwise, only \( i \) years in the future, where \( i \) is the proper reserve/production ratio. The size of \( i \) determines when the ceiling price based on backstop technology becomes pertinent to the withheld barrel.

Third, to obtain the present value of the opportunity to sell a barrel of oil for \( B \) dollars \( i \) years from now, a discount rate \( (r) \) must be applied to the future receipts from the sale of this barrel. Oil-in-the-ground is an asset whose only return to the holder is the price increase that it is expected to bear. For the seller to suffer no loss by withholding a barrel of oil, this capital gain must equal or exceed what an alternative financial or real asset would yield. With a competitive and frictionless capital market, \( r \) would be the return on the best investment alternative to oil-in-the-ground. If the expected annual rate of oil price increase \( (b) \)

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7 Total oil reserves probably have not been discovered, and future consumption rates are likely to diverge from current levels due to autonomous factors such as an acceleration of the development process in less developed countries or possibly environmental delays to the substitution away from oil as the primary fuel source in developed countries. Consequently, the current reserve/production ratio may need modification. If production growth is expected to exceed the growth in proven reserves, then the reserve/production ratio must be deflated to obtain the correct \( i \). If new discoveries and revisions in reserve estimates are expected to outpace production growth in the near future, then the proper \( i \) is an inflated reserve/production ratio.
from the current level to $B_t$ were less than $r$, the maximizing producer would transfer future sales to the present and invest these extra proceeds in the higher yield alternative assets.

Finally, since part of the expected price must defray the expense of producing the saved barrel in the future period, an expected lifting cost ($C_t$) must be deducted from the $B_t$ amount to obtain the net value of oil that is replaceable by the backstop. To convert $C_t$ to present value it must also be subject to the relevant discounting factor.

In addition to the scarcity cost or opportunity cost, a current lifting cost ($C_o$) must be included to obtain an estimate of the price that producers must receive to be fully compensated for selling a barrel of their oil now. Collecting terms, the full cost of the marginal barrel or the price that would prevail under competitive conditions is:

$$P_o^c = C_o + (B - C_t) (1 + r)^{-t}$$

This is the level to which the current price of crude oil would move if the oil cartel broke up or ceased to be effective and market forces alone determined price.

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Detailed estimates of this price exist, so it is not necessary to duplicate all of those parameter estimates here. Using a \((B - C)\) value of $13.50 (in 1975 dollars), a \(C_0\) of $0.25, an \(i\) of 25 years (or a \(t\) of the year 2000), and an \(r\) of 10 per cent, Professor Adelman estimates that the competitive price of Persian Gulf oil in 1975 was $1.50 per barrel.\(^9\) Professor Nordhaus uses a \((B - C)\) range of $7.60 to $11.60 (in 1970 dollars), a \(C_0\) of $0.06 for Persian Gulf oil, an \(i\) of 40 years, and an \(r\) of 10 per cent and estimates that a competitive or efficiency price for Persian Gulf oil plus delivery charges to the U. S. would be about $1.20 per barrel in 1970 and about $1.70 per barrel in 1980.\(^10\) Though these estimates are not identical, they are both small fractions of current world oil prices.

2. Causes for the Excess Price

The discrepancy between the market price and these estimates of the competitive or efficiency price could be due to factors other than the existence of a monopolistic element in oil sales. The


Using his lower bound:

\[P_C^o = \frac{0.25 + (13.50)^2000}{(1 + 0.1)^{-25}} = 1.50.\]

Using his lower bound:

\[P_C^o = \frac{0.06 + (7.60)^{2010}}{(1 + 0.1)^{-40}} \text{ plus approximately } $1.00 \text{ per barrel in transportation cost from the Middle East to the U. S. mid-continent } = 1.20.\]
opportunity cost component, \([(B - C) / (1 + r)^t]\), of the \(P^c_o\) equation varies directly with the size of \(B\) and \((B - C)\) and inversely with the size of \(C\), \(r\) and \(i\). Explaining a $12 price for a barrel of oil by postulating appropriate values for these variables, however, seems to require some highly improbable assumptions about the perceptions of oil sellers.

Professor Nordhaus suggests that one reason producers might feel that the full cost of current oil production is above his estimate is that they are more pessimistic about the future of technological advances in energy production and use than is he. In effect, these pessimists would argue that his choice of \(B_t\) is much too low. Justification for this view might involve assertions that the chosen \(B_t\) does not include enough return to compensate for such things as environmental damage caused by the wide use of coal, safe disposal of nuclear waste, and unforeseen engineering problems that may arise in the development of and conversion to substitute energy processes on a large scale. A not incidental component of this higher cost may result from nuisance suits by environmental forces who would like to see the world forced to convert to a less energy-intensive lifestyle. With a higher \(B_t\) and \((B - C)_t\), the ceiling to which the price of oil will rise during its remaining tenure as the key energy source is higher than these estimates foreseen.

\(^{11}\text{Ibid., p. 559. One recent estimate of the minimum cost of producing the equivalent of a barrel of crude oil from synfuels are in the vicinity of $12.50 to $20 rather than $7.60 to $11.60. "Shale Closest Among Liquid Synfuels," The Oil and Gas Journal, January 11, 1977, pp. 24-25.}\)
Nordhaus reports that anything but the most drastic pessimism does not raise his discounted price significantly. Using the other parameter values employed in his model, a \((B - C)_t\) value of 50 to 70 times larger (in the range of $550 per barrel of oil equivalent) than his best estimate is required to generate a current user plus lifting cost of $12 per barrel. Attributing to oil sellers an expectation that over the life of their reserves the price of oil will rise at a rate sufficient to rendezvous with this much higher ceiling requires rather extreme views about the cost of energy substitutes. Estimates that use a \((B - C)_t\) value of as much as $50, only raise the \(P^c_0\) estimate to $2.16 per barrel.

A somewhat related supposition about the inflated current price is that oil producers act as a myopic asset managers rather than as proprietors who must eventually sell all of their commodity.\(^{12}\) For instance, if oil owners treat their reserves like a growth stock and expect the world oil price to rise to $19.50 per barrel in 1980, a discounted opportunity cost of $12 per barrel in 1976 is about right. In effect, the rate of price increase expected by oil sellers is based not on the long-term rendezvous with a substitute price, but on a projection of recent past price trends into the near future.

\(^{12}\)Ibid., pp. 536, 560, 571, and 573.
If the Nordhaus and Adelman calculations are reasonably accurate, then some of these owners will be unpleasantly surprised when they cannot realize the anticipated rate of return. With the expertise that oil producers can buy with their new-found wealth, it seems improbable that they can be expected to operate under this kind of delusion. This explanation then implies that producers with large oil reserves must be confident that they can continue to find oil buyers who are deceived about the true scarcity cost of oil-produced energy.

A third avenue for questioning the \( P_o^C \) calculations made by Nordhaus and Adelman involve objecting to their choice of the rate at which future profits are discounted by oil sellers. The profit maximizing producer would use a rate based upon what an alternative financial or real asset would yield. Both Nordhaus and Adelman select a real discount rate of 10 percent per annum. Professor Adelman picks it because this was the "median after-tax return on equity for all (U. S.) manufacturing" between 1957 and 1965, "the last period of price stability."\(^{13}\) Presumably then, it is the expected yield on a diversified portfolio of alternative assets to oil. Professor Nordhaus chooses 10 percent because it "approximates the average pretax return on reproducible tangible capital, and as

such is a reasonable estimate of the social productivity of invest-
ment." Spending on capital should increase future real consumption
at this rate, so the marginal profit gained from holding oil must
increase at least at this rate to be as productive an investment.

By the circumstance of possessing most of the world's known
reserves, the OPEC nations are the ones who pick the discount rate
to use in the scarcity cost calculation for crude oil. To this point
the rate at which oil prices are expected to rise (b) and the rate at
which profits received in the future are discounted back to the
present (r) have been treated as approximately equal. However,
the rate of discount (r') actually applied by some of these nations
to future oil earnings may depart significantly from a rate (r)
selected on the basis of the average yield of alternative assets.

First, there is the risk that the estimate of \((B - C)_t\) will
be off the mark. For example, if the one used turns out to be too
high (say unexpected technological changes put the future marginal
profit below $13.50), the future value of the saved oil will not
be as high as anticipated. An underestimation of the true \((B - C)_t\)

\[14\text{Op. Cit., p. 548. Ten percent was the ratio of profit}
\text{income to the estimated replacement cost of private capital in 1968.}\]

\[15\text{If the marginal lifting cost (C) for crude oil were zero}
\text{[i.e., if } B_t \text{ equaled } (B - C)_t], \text{ the two rates would be equal.}
\text{Relative to } B_t, \text{ C is minute for the Middle East. Therefore, to focus}
\text{on other reasons for differences between these two rates, the assump-
\text{tion of zero marginal lifting costs will be made.}\]
is also possible. Generally, the wider the variance in the estimates about \((B - C)_t\) or the less certain producers are about the level of future oil prices, the greater is the discount rate they are expected to apply to deferred oil earnings. Uncertainty about \((B - C)_t\) has the effect of reducing the opportunity cost component of full cost that is calculated by these (uncertain) producers. Apparently because of the difficulty involved in measuring the influence of this kind of risk on the discount rate choice, both estimates make no attempt to adjust for this factor. This conservative omission implies that the full cost estimate may be higher than the one actually perceived by the oil producers (or, perceived \(P^C_o\) is less than estimated \(P^C_o\)).

A second type of risk that affects the discount rate choice can arise in connection with the location of the alternative investment opportunities. A 10 percent real rate of discount is probably not too high for exporting countries that can spend most or all of their oil proceeds on internal development projects, such as infrastructure and basic industry. However, several OPEC nations are characterized as being low absorber countries because their total oil incomes far exceed their current ability to usefully spend

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foreign exchange on domestic projects. Governments in these nations must (or at least do) place a large portion of their oil revenue in external investments.

Part of the pecuniary return on these alternative investments may be compensation for the greater risk that low absorbers bear because of the external placement of their surplus income. When their funds are committed to outside projects, the investment is subject to several risks which reduce the rate of return to be compared with the rate of appreciation in the value of oil reserves. Such risks include those associated with (1) invested capital being held hostage by unfriendly foreign governments, (2) earnings being taxed at exhorbitant rates by envious foreign governments, (3) earnings being depreciated by adverse exchange rate movements or by domestic inflation in recipient countries that is induced in no small measure by high prices for oil imports, and (4) capital loss resulting from poor investment choice. Consequently, the return sacrificed by low absorber countries on store of wealth assets (even those that apparently have high yields such as development programs in their high absorber neighbors, the stock of growth companies, or real estate in the advanced countries) could have a real, risk adjusted yield rate of less than 10 percent.

If the risk associated with the external placement of marginal oil proceeds is more important to these countries than the risk associated with the variability of the \((B - C)_t\) estimate, they may apply a real discount rate \((r')\) below \(r = 10\) percent to future oil earnings and perceive a \(P_{0C}'\) greater than \(P_{0C}\) as calculated by Professors Adelman and Nordhaus. Recalculating Adelman’s projection using a 5 percent discount rate yields a scarcity value of $4.00 per barrel rather than $1.25. Nordhaus reports that a 5 percent discount rate makes a dramatic (unreported) difference in his calculations, also. Discount rates below 5 percent raise the scarcity value even more sharply. However, using Adelman’s numbers, an \(r\) of 0.5 percent must be chosen to generate a marginal user plus lifting cost of $12 per barrel. Generally, a drastic change in either the \(B\) or the \(r\) values used by Nordhaus and Adelman is required to obtain a \(P_{0C}'\) in the vicinity of $12 per barrel. This requirement indicates that more moderate and reasonable modifications that might be made in those parameters, even in combination, do not produce enough increase in the scarcity value of crude oil to justify calling $12 an efficiency price.

Direct evidence of the presence of monopoly activity on the sellers’ side of the world oil market is also available. The maintenance of excess production capacity is consistent with the hypothesis that producers are withholding output in order to drive up the price. Under competition, producers would increase output
as long as the extraction plus opportunity cost of the extra barrel is less than the market price they would receive for it. Table 3-2, pages 76 and 77, reports the existence of significant unused production capacity in place in most of the OPEC nations. The cost to these producers of increasing production therefore involves no added exploration and development costs. Thus, since the cost of increased output is just what is estimated above, the excess capacity evidence indicates that sellers are withholding output to hold price above cost.

Monopoly interference is thus the most plausible explanation for the inflated level of the current world oil price. Alternative explanations using higher \((B - C)_t\) values, shorter time horizons, or lower discount rates to adjust the scarcity value to $12 per barrel must rely on extreme assumptions about the value involved. Excess capacity evidence further supports the finding of monopoly. The above arguments that world oil price is above the competitive level do not say anything about how it is determined, and in particular do not imply that it is set at a joint profit maximizing level for the cartel. The magnitude of the \(P^C_0\) estimate does indicate that the OPEC cartel must exert enough control over members to maintain a selling price that appears to be several times the full cost of extra output.

B. Price Determination

Ideally, a group of sellers that mutually agrees to raise price above the competitive level would attempt to maximize group
profits. This joint monopoly solution can be demonstrated using a familiar static model. Assume the group sells a sufficiently homogeneous product so that all sales can be made at essentially identical prices. Also, assume that the industry in question is initially operating in a competitive equilibrium. Let \( D_g \) in Figure 3-1 represent the current demand confronting the group of firms that decides to act collusively. If a competitive fringe is tolerated by the group, then \( D_g \) is the industry demand curve less the output that the existing fringe producers provide. \( D_g \) is the residual demand curve of the dominant firm model.

A central decision body would derive a marginal revenue curve (\( MR_g \)) from \( D_g \) and would construct a marginal cost curve (\( EMC \)) for the group by aggregating the individual member marginal costs. The monopoly price (\( P_m \)) and quantity (\( Q_m \)) can thereby be set for the cartel. An output cutback (\( Q_c - Q_m \)) that is necessitated by this price policy must then be distributed among the group. Where a competitive fringe is permitted, the cartel must usually expect to have to accept all of the excess capacity needed to support \( P_m \).

In the case of an exhaustible resource, this marginal cost can be assumed to include the scarcity or opportunity cost factor in current production as well as the present production costs associated with the marginal barrel. Inclusion of the opportunity cost factor means that long run marginal cost would increase with output because scarcity value rises as current production expands. Larger production now reduces the interval over which reserves will last, thus lowering the discounting factor applied to future sales revenue. See the competitive price equation on page 43.
FIGURE 3-1

JOINT PROFIT MAXIMIZATION BY THE CARTEL

Price

Representative Member

Price

Group

Quantity

$P_m$

$a$

$b$

$P_c$

$mc$

$sac$

$q_m$

$q_c$

$Q_m$

$MR_g$

$Q_c$

$D_g$

$Emc$

Quantity
in the market. To maximize cartel profit, the central agency should minimize cost by assigning each member an output quota like $q_m$. Assume for the purposes of this section that the cartel can enforce the quotas that it decides to assign.

For a producer to join the cartel, the economic profit plus the normal profit (within the average cost) promised at the restricted output must exceed the normal profit that the single firm would expect to receive at the larger output available if it acted independently at $P_c$. Assuming quota enforcement, this condition should be met except under one of the following situations. One, the individual firm cannot adjust plant capacity easily or quickly to the smaller level of output. Further, with its existing plant the firm must absorb too much overhead expense for too long in operating at $q_m$ to make the choice more profitable over the relevant decision period. Two, since the cartel will probably have to absorb all of the output cutback that is necessary to sustain $P_m$, it must control a large enough proportion of total industry output to permit members to bear the nonproductive overhead of idle capacity. If too little capacity (or too few firms) join the cartel, this burden can be too much for the cartel members to bear. Neither of these conditions

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19In Figure 3-1 for instance, the normal profit component of $P_{eq}$ must be smaller than the normal profit component of $cbq_0$ plus $P_{abc}$.

20Because the market for crude oil is not static but rather is still growing, any hesitancy producers feel on this account could diminish. By delaying expansion cartel producers can allow output at the established price to grow into inplace capacity.
appears to exist to a degree that makes cartel membership unattractive to the OPEC countries.

The profit maximizing price depicted in Figure 3-1 is unlikely to be achieved in practice. Decisions made by an association result from negotiation, give-and-take, and compromise among the points of view and interests of the separate entities that make up the cartel. When profits are distributed according to the production quotas assigned to each member, all firms will seek to have their quotas enlarged. Certain producers that are able to exert the greatest pressure on the central decision body can demand and receive shares in excess of those dictated by cost minimization consideration.\(^{21}\) Where the compromise is to assign each firm an equal quota, those producers with different costs will disagree on the optimum level for \(P_m\) (those with higher costs preferring a higher \(P_m\) than those with a lower marginal cost at each output level). Therefore, it seems unlikely that an association would be able to act precisely as would a monopolist that had control of the production capacity of all of the members.\(^{22}\)

Another reason that the \(P_m\) depicted in Figure 3-1 may not be established by the cartel is that members wish to pursue an entry

\(^{21}\)For example, firms which are less averse to risking the demise of the cartel by pulling out can demand and obtain an output share which raises their marginal cost above that of their more cautious collaborators.

\(^{22}\)In theory (but seldom in practice) a profit pooling and sharing plan could be devised which would ensure the pure monopoly outcome while satisfying the demands of individual members.
limiting price policy. If active and potential fringe members can expand output profitably with a market price of \( P_m \), the dominant group's market and profit share will decline as this new capacity is developed. Further, if high cost substitute products are potentially available, \( P_m \) may be high enough to induce encroachment on the narrowly defined market of the dominant group by these alternative products.\(^23\) The limit price model can be used to formally specify these concerns.

1. Basic Limit Price Model

Let \( D_g \) in Figure 3-2 again represent the demand curve facing the collusive group. Two modifications of the way in which \( D_g \) was conceived of in Figure 3-1 are necessary. First, the industry demand curve, of which \( D_g \) is the residual part used by the dominant group in its price setting role, is expanded to include products that (following an adjustment period) can serve as reasonable substitutes for the product of the cartel. For example, \( D_g \) will be viewed as part of the demand for energy rather than as part of the demand for crude oil only. Second, for convenience of exposition it is assumed that this industry demand curve is expected to be stable,\(^{23}\)

FIGURE 3-2
LIMIT PRICING WITH A COST ADVANTAGE OVER ENTRANTS
so that it can serve as a long run demand curve. Since \( D_g \) is derived from this industry demand curve, it too can be viewed as a long run demand curve.

Suppose that the cartel group is able to operate on the combined short run average cost function \( AC_g \), with the corresponding marginal cost \( MC_g \). Suppose furthermore that existing and potential fringe members have a lowest attainable long run average cost of \( AC_n \) and that all of these firms can achieve this cost level in time. Finally, assume that the more broadly conceived market is so large that fringe producers expect their individual output contributions to have no perceptible influence on price. In other words, the existing and potential fringe take the price set by the dominant group as given.

If the price is set at \( P_m \) (or any price even slightly above \( AC_n \)), firms in the competitive fringe realize supra-normal profits.

\[24\] To assume otherwise creates two problems which unnecessarily complicate the following analysis. One, as Scherer points out, this assumption is necessary in order to depict graphically a demand curve that covers more than one period, i.e., a long run demand curve. If the demand curve is not stable, then either the price or quantity demanded are not fully determined in any specific period by the analysis embodied in the diagram. *Industrial Market Structure and Economic Analysis* (Chicago: Rand McNally, 1971), pp. 213-14 and p. 219. Two, if some rate of growth in the industry demand is permitted, then questions of how this growth is distributed among existing and entering producers must be addressed. For a discussion in this vein, see J. N. Bhagwati, "Oligopoly Theory, Entry-Prevention and Growth," *Oxford Economic Papers*, Vol. XXII, No. 3 (November, 1970), pp. 297-310.
Existing producers have the incentive to expand or replicate their plants and new firms have the incentive to enter the industry. Since the fringe firms are not subject to quotas, as are the cartel members, they will respond to these incentives. In this situation, Dg will not remain stable, but will shift to the left and continue shifting to the left as long as price is kept above ACn. The result would be a progressive decline in the dominant group's output share and thus its share of industry profits. Should the energy market be growing over time, the dominant group may suffer relative but not absolute decline in output. If the cartel can exert enough discipline to prevent its members from expanding individual capacity, unit costs will not rise with the decline in market share and squeeze group profits from below.

To avoid the erosion of its monopoly position, however, the cartel must set and maintain the entry-deterring or limit price of \( P_1 \) (or, more precisely a price slightly below \( P_1 \)) by expanding its output to \( Q_1 \) (or slightly above \( Q_1 \)). Since the cartel has a cost advantage over the fringe, it could still earn supra-normal profits of \( P_{1 \text{egh}} \) (less than \( \sum_{m} P_{abc} \) of Figure 3-1, where \( N \) is the number of members) currently while preventing expansion of the fringe and shrinkage of its market share. In choosing a price policy, the dominant group must therefore compare the initially lower but more persistent profits at \( P_1 \) with the initially higher but eventually lower profits at \( P_m \). This choice may be depicted in Figure 3-3,
FIGURE 3-3
PROFIT STREAMS FOR THE ESTABLISHED FIRMS

Monopoly Profits

A

B

C

D

E

F

G

H

0

Time

K

T

R

S


which shows the collusive firms' (undiscounted) profit stream over time.\(^{25}\)

If \(P\) is chosen, monopoly profits in the initial period are of size \(A\). Because this encourages entry, the cartel's output share and thus profit declines toward \(B\) over time. At some critical point \((T)\) the cartel will be forced to cut price at least to the entry deterring level to maintain internal discipline. If it does not the shrinking market share and profits will induce individual members to begin leaving the cartel. If price is reduced only to \(P_1\) at \(T\), then the stream of profits to the cartel is described by the curve \(ABKCD\). If price is cut to a point below \(P_1\), in an attempt to induce negative entry (exit) by fringe producers, the profit stream is described by \(ABKCEF\). The lower price at \(T\) results in even lower cartel profits, but as this price is maintained the cartel recaptures customers and increases its profits.\(^{26}\) If \(P_1\) is chosen initially, the profit stream is described by the line segment \(GKH\). The pricing strategy choice may then be viewed as a comparison between \(ABKG\) and \(HKCD\).


\(^{26}\)Both Scherer and Bhagwati, *op. cit.*., reason that once displacements have occurred, they tend to become permanent. The rationales given are that there is often some conversion of capital stock by buyers to accommodate the new inputs from entrants and/or there is buyer resentment for price now revealed to have been exploitative. This suggests that the absolute value of the slope of \(EF\) will be smaller than the absolute value of the slope of \(AB\) and tends to argue against a price cut to a level below \(P_1\) by the dominant group.
Three variables affect the decision between the ABKCD (or ABKCEF) path and the GKH path. These variables are: (1) the size of \( \sum_{m} P_{m} \) abc relative to \( P_{egh} \) (or \( A \) relative to \( G \)), (2) the rate at which profits under the \( P_{m} \) strategy are expected to erode due to entry, and (3) the discount rate applied to future earnings.\(^{27}\) The influence of each of these variables, assuming that the other two are held constant, is as follows. The greater the difference between the two profit sizes, the less likely it is that existing firms will choose to deter entry. This course is expected because of the fact that as the difference between \( A \) and \( G \) grows, the proximate sacrifice that must be made by the established firms acting to forestall entry (ABKG) also increases relative to HKCD. The greater the rate at which entry is expected to occur at \( P_{m} \), the less likely it is that existing firms will choose that price. The period for which they enjoy ABKG before cartel share has been reduced to the critical point is smaller than if the entrant response were slower. Finally, the greater their discount rate, the more likely established firms are to choose \( P_{m} \). They place proportionately less importance on the future profits foregone due to entry (HKCD).

2. The Role of Reserve Levels and Absorption Capacity

Using this model it is possible to examine the effect on price preferences of each of two conditions relevant to the oil

\(^{27}\)Scherer, op. cit., p. 222.
cartel. First, producers with different productive lifetimes, usually measured by reserve/production ratios, but identical in other respects, may disagree on the choice between a $P_m$ and a $P_1$ strategy for the following reason. Any given rate of entry provoked by $P_m$ will appear to be (relatively) faster to the high reserve producer than to the low reserve producer. An enterprise that expects to sell for only a period of $R$ years ($R = \text{the reserve/production ratio after adjustment for the anticipated changes in each component}$) tends to be less concerned about the profit loss after $T$ than does a high reserve producer who expects to sell for a period of $S$ years (where $R$ is less than $S$).

The conditions under which differences in time horizons could lead to differences in the choice between $P_1$ and $P_m$ can be developed using Figure 3-3. Assume that that figure describes the circumstance for both producers. This assumption implies that the perceived difference between current monopoly profits and limit price profits ($A - G$) are equal for each producer, the future critical point $T$ perceived by each is the same, and the rates at which future profits are discounted by each are the same. For diagramatic convenience the figure depicts an undiscounted profit stream. Thus, each producer is in effect assigned a discount rate of zero in this partial analysis. The only difference between the producers is that one has a production time horizon of $R$ on the time vector and the other a time horizon of $S$. In terms of the figure the profit
maximizer would select $P_m$ over $P_1$ if $ABKG$ is larger than $HKCD$ bounded by its expected date of exhaustion (R or S). Based upon a commonly perceived location of $T$, three cases can be identified.

First, if both producers expect the rate of entry to be so gradual that $T$ occurred to the right of $R$ and $S$, then neither member would even consider the possible need to exercise restraint in the pricing decision. There is no $KCHD$ marginal loss to weigh against the initial gain from charging $P_m$. This situation may be considered as equivalent to that identified as blockaded entry by Joe Bain.28 Differing reserve levels would not lead to a conflict of interest about the choice of a uniform price level in this situation.

Second, if $T$ occurs between $R$ and $S$, the low reserve producer still has no $HKCD$ to consider and so would always favor $P_m$. He does foresee a smaller absolute profit gain from $P_m$ than $ABKG$ because his production time horizon is inside the $BK$ boundary. The high reserve producer would have a $HKCD$ marginal loss to compare with the full marginal profit of $ABKG$, but would prefer $P_1$ only if that loss exceeded this larger initial profit. A disagreement over

28The OPEC secretariat serves as a common source of expert information to member oil producers. The perception by individual members of the rate of development of alternative sources (entry) and by extension of $T$ is therefore based on the same information.

the $P_m$ or $P_l$ choice in this case would require that a large difference between $R$ and $S$ exist.

Third, in the situation actually depicted in Figure 3-3 $R$ and $S$ could both occur to the right of $T$, indicating that each producer expects entry to force a price adjustment in the future. Both producers have the same initial profits to compare with different eventual losses from choosing the $P_m$ over the $P_l$ strategy. A range of situations exist in which the low reserve producer would prefer $P_m$ ($ABKG > HKCD$ bounded by his expected date of exhaustion) and the high reserve producer would prefer $P_l$ ($ABKG < HKCD$ bounded by his more distant expected date of exhaustion). The difference from case two is that this conflict of interest does not require a large interval between $R$ and $S$.

In sum, everywhere that the high reserve producer would choose $P_m$, so would the low reserve producer. There are situations where the converse does not hold. Thus, the potential for disagreement exists and such disagreements would always find the high reserve producer (other things equal) on the side of a $P_l$ strategy.

Another difference between the national members of the OPEC cartel which can lead to a disagreement on profit maximization grounds over the choice between $P_m$ and $P_l$ is the difference between their absorptive capacities. Those producers with economies that have a greater ability to spend foreign exchange receipts on productive domestic projects now are likely to apply a greater discount rate to future oil profits than are low absorbers. The former have
more secure investment alternatives to oil-in-the-ground than do the latter for the reasons outlined on page 50.

To see the effect of this difference on the price choice, assume that two producers have identical time horizons ($R = S$ in terms of the previous analysis), that both expect the same rate of entry and each perceives the same $T$, and that $A - G$ is the same for each. Suppose, however, that producer $W$ has a greater rate of discount than does producer $Z$ ($r_w > r_z$). Producer $Z$ has a higher regard for extra profits that are lost after entry forces an adjustment in price (HKCD) relative to current extra profits than does producer $W$. Consequently, at some time horizons where HKCD discounted at $r_z$ would lead to a choice of $P_1$, HKCD discounted at $r_w$ would not. Table 3-1 presents an example demonstrating this situation.

For sellers of a nonreproducible commodity the choice is not likely to be so clear cut as in the model above. Because the fixed supply of such a commodity will eventually be exhausted, some replacement or entry is inevitable and thus probably acceptable to the dominant group. The alternatives for the cartel become not a choice between ignoring entry or deterring all entry but a choice between faster or slower rates of entry. This more difficult problem can be fitted into the above model if it is assumed that the rate of entry is directly related to the amount by which the price set by the cartel exceeds $AC_n$, or equivalently the amount by which current cartel profits exceed $P_{1\text{egh}}$. 
TABLE 3-1
EXAMPLE OF THE EFFECT OF DISCOUNT RATE DIFFERENCES ON THE LIMIT PRICE CHOICE

1) Consider a situation where $A - G$ (in Figure 3-3) is equal to 100, where the annual rate of entry elicited by this difference is $\eta = 0.1$, and where the annual discount rate for producer $W$ is $r_W = 0.1$ and the discount rate for producer $Z$ is $r_Z = 0.05$.

2) For $P_1$ to be preferred to $P_m$, the following expression must be negative:

$$V_j = (A - G) \sum_{i=1}^{T-1} (1 + r_j + \eta)^{-i} - (K - C)_j \sum_{i=1}^{U} (1 + r_j)^{-i}$$

where $j = W, Z$ (producer), $T$ is the point at which the price must be cut to sustain the cartel (assumed to take place at the beginning of a year), and $U$ is the uniform time horizon for both producers.

3) Assume profit must be cut by 1/4 at $T$ to stop the flow of entry. Then

$$(K - C)_j = 3/4 (A - G) (1 + r_j + \eta)^{-T}$$

4) Let $T = 3$, i.e., price must be cut at the beginning of the 3rd year.

$$V_W = 100 \sum_{i=1}^{2} (1 + 0.1 + 0.1)^{-i} - 75 (1.2)^{-3} \sum_{i=1}^{U} (1.1)^{-i}$$

$$V_Z = 100 \sum_{i=1}^{2} (1 + 0.05 + 0.1)^{-i} - 75(1.15)^{-3} \sum_{i=1}^{U} (1.05)^{-i}$$

The problem is to find a $U$ where $V_W > 0$ but $V_Z < 0$.

5) Consider $U = 5$

$$V_W = 100 (1.53) - 43.4 (2.06) = 153 - 89.4 = 63.6 > 0$$

$$V_Z = 100 (1.63) - 49.3 (2.47) = 163 - 121.7 = 41.2 > 0$$

Consider $U = 7$

$$V_W = 153 - 43.4 (3.13) = 153 - 136 = 17 > 0$$

$$V_Z = 163 - 49.3 (3.93) = 163 - 193.6 = -30.6 < 0$$

Consider $U = 9$

$$V_W = 153 - 43.4 (4.02) = 153 - 174.5 = -21.5 < 0$$

$$V_Z = 163 - 49.3 (5.25) = 163 - 258.9 = -95.9 < 0$$

6) This indicates that, as producers' uniform time horizons expand, those with the smaller discount rates will opt for $P_1$ over $P_m$ before those with larger discount rates.
This assumption seems reasonable. Due to imperfection in the information about costs and potential profits, a small positive gap between price and AC_n will induce entry or expansion by only the most alert and rash entrepreneurs. As the size of this gap is increased, it becomes more difficult to overlook the profitable opportunity, so the rate of encroachment by the fringe should increase.

The prices treated in the above model, P_m and P_1, can be conceived of as upper and lower limits, respectively, to the price choices available to this cartel. The choice between a price closer to P_m, with its higher rate of entry, and one closer to P_1, with its lower rate of entry, depend on the same variables as the choice between P_m and P_1, themselves. In particular, the prediction that producers with larger total reserves relative to output rates and/or smaller discount rates tend to prefer a price nearer P_1 than do producers with smaller reserve/production ratios and/or larger rates of discount remains unchanged.

C. Pressure on the Established Price

If the assumption that the cartel can automatically enforce the quota it decides to assign to each member is relaxed, another problem besides the choice of a uniform price can plague the collusive group. The problem stems from the fact that a price collectively fixed above the competitive level creates incentives for individual members to expand output beyond the quantity which will sustain the agreed upon price. Suppose the group agrees to
raise the market price to the level of \( P_k \) as depicted in Figure 3-4. This level may be either at or close to a short run profit maximizing price or to a limit price where the group has a cost advantage over entrants. Each firm in the cartel is expected to confine itself to some prorata quantity like \( q_k \), where \( \sum_{k=1}^{N} q_k = Q_k \) on \( D_g \) for an \( N \) member cartel. Firms that feel victimized by their assigned quotas may be tempted to cheat.

Even firms that do not feel victimized by the output and profit sharing arrangement at the reduced output have the urge to cheat. As long as other firms in the cartel adhere to \( P_k \), the demand curve facing a single member is \( d \). It is more elastic than the cartel demand curve at \( P_k \) since a price cut by the individual member would attract sales away from other members. Because the marginal revenue (mr) at \( q_k \) for the producer acting independently exceeds its own marginal cost, this firm can increase its individual profits by expanding output beyond \( q_k \). The cheating member can add up to the amount depicted by the triangle \( xyz \) to its profit by pushing output to \( q_v \).

If the demand curve faced by the cartel is very inelastic over the relevant range, the overcapacity created for its members

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\(^{30}\)If \( P_k \) is a limit price, there is no simple rule to assign each member an output share as there is in the joint profit maximizing monopoly collaboration. If each member sets its own output at the level where its marginal cost equals group marginal revenue, too little will be produced. If output is set where price is equal to marginal cost, too much is provided to the market to support \( P_k \). Negotiation must establish some intermediate output rule for the members of the group. Scherer, \textit{op. cit.}, p. 223.
FIGURE 3-4
THE DILEMMA OF A CARTEL

Price

Representative Member

Price

Group

Quantity

Price

mc

d

mr

sac

z

q_k

q_v

quantity

Q_k

Quantity
by the price hike is relatively small. In such a situation, the individual members do not have much extra capacity to employ in an attempt to enhance their profits in the short run. The revenue increase generated by the price rise, however, can provide internal financing for an expansion of production capacity by selfish members.

When the single member depicted in Figure 3-4 is able to increase its sales volume without attracting attention, the output of the average firm still operating at the agreed upon price would be cut to $Q_k - q_v/N-1$. If the number of collaborators ($N$) is large and the commodity sold by the cartel is homogeneous, this output loss may be so diffused and small that no one loyal member would perceive and react to it. Thus, the price cut may go undetected.\(^1\) The temptation to cheat tends to be intensified by an awareness of the fact that rivals in the cartel face the same secret profit opportunity. This situation is referred to as the prisoners' dilemma. If it pays for each member to cheat on the assumption that the others will not, then each is under pressure to cut price by some amount (to protect itself) no matter what the others in fact do.

Where buyers and sellers are typically paired because of proximity or because of the attachment to minor product variations,

\(^{31}\)George Stigler, *The Organization of Industry* (Homewood, Ill.: Richard D. Irwin, 1968), Chapter 5 and Telser, *op. cit.*, pp. 200-205, develop a probability model to indicate the latitude for secret chiseling in such a situation as a function of seller numbers, buyer turnover, and/or market variability.
the danger of undetected cheating is considerably reduced. Even if product heterogeneity does not segment the market for sellers, a small N can make the average sales loss large enough to attract attention. Upon detection, the usual assumption is that those cheated will attempt to recapture their accustomed share of the market with retaliatory price reductions. The consequence is a reduction of profit for all members. Therefore, a price cutter in an oligopoly cartel must anticipate only a temporary gain followed by a period of more permanent loss relative to its assigned share of cartel profit.

The cheater does not always have to be deterred by the prospect of detection by rivals. After losing some sales to the lowered price, rivals may feel that they retain enough demand to profit more by continuing to charge $P_k$ than by matching the price cut and increasing the chances for a price war. Similarly, after beginning the rounds of price cutting, one or a subgroup in the cartel may come to recognize the negative sum outcome of this activity and set the "conditional optimal price" of a price leader

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32D. K. Osborne has worked out a theoretical system whereby the cartel can assign quotas that embody the most efficient response by loyal members to cheating that is detected. This system depends on all of the other members acting in unison to regain only their accustomed share of the market. "Cartel Problems," *American Economic Review*, Vol. LXVI, No. 5 (December, 1976), pp. 835-44.
and allow the other member(s) to cheat. If the "other" member(s) can count on this reaction, detected cheating can be profitable after all.

A cheater that has a sufficiently high rate of discount may find cheating profitable for another reason. If detection and full retaliation occur only after a lag, the present value of the proximate cheating gains can outweigh the discounted value of more extended future losses. Alternatively, a price cutter may gain even after complete retaliation. For instance, if entry is slowed by the price reduction, future earnings for some members may be improved rather than worsened by the price reduction. Consequently, the greater chance for detection in small numbers, segmented cartels need not necessarily preclude cheating. Thus, an economic cartel may not only have difficulty in choosing the rate at which to allow entry but also in preventing some of its members from violating the compromise agreement.

D. The Economic Character of the Oil Cartel

Two sources of economic conflict in a cartel, choice of a uniform price level and maintenance of a price above marginal cost,

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have been developed in the above two sections. Due to circumstances in the world oil market secret chiseling by members for economic gain seems to be less of a threat to OPEC than the more open difference over the choice between a monopoly price and a limit price. This section summarizes the set of facts that lead to this conclusion.

1. Conditions that Discourage Chiseling

As already noted, OPEC has no apparent prorationing plan for controlling individualistic behavior by members. Table 3-2 presents estimates of the overcapacity burden born by the OPEC nations during 1975 and 1976. The first two columns are the daily production capacity of each nation listed in millions of barrels per day (MBD). The last two columns are computed by subtracting average daily production from this figure and dividing by the capacity. It appears that most OPEC producers have the capacity to respond to cheating incentives.

In a growing world market for energy and for crude oil this current excess capacity in OPEC need only be a temporary burden. The market demand at the current price level is expected to grow into existing capacity. The cartel will face a continuing excess capacity burden only if it cannot prevent uncoordinated expansion by individual members. As world demand grows some producers may approach

### TABLE 3-2

EXCESS CAPACITY BURDEN ON OPEC PRODUCERS

<table>
<thead>
<tr>
<th>Country</th>
<th>Capacity (MBD)(^a)</th>
<th>Production (MBD)</th>
<th>Excess Capacity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecuador</td>
<td>0.25</td>
<td>0.225</td>
<td>0.160</td>
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<td>Gabon</td>
<td>0.25</td>
<td>0.25</td>
<td>0.225</td>
</tr>
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<td>Indonesia</td>
<td>1.7</td>
<td>1.7</td>
<td>1.305</td>
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<tr>
<td>Nigeria</td>
<td>2.5</td>
<td>2.3</td>
<td>1.785</td>
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<tr>
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<td>3.0</td>
<td>2.6</td>
<td>2.345</td>
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<tr>
<td>Iran</td>
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<td>6.7</td>
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TABLE 3-2 CONTINUED

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<th>Country</th>
<th>Capacity (MBD)</th>
<th>Production (MBD)</th>
<th>Excess Capacity (%)</th>
</tr>
</thead>
<tbody>
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<td>2.34</td>
<td>2.38</td>
<td>1.665</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>11.5</td>
<td>11.5</td>
<td>7.075</td>
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<tr>
<td>OPEC</td>
<td>39.04</td>
<td>38.355</td>
<td>27.135</td>
</tr>
<tr>
<td>Arab OPEC(^c)</td>
<td>24.54</td>
<td>24.58</td>
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</tr>
<tr>
<td>Persian Gulf Skeikdoms in OPEC(^d)</td>
<td>18.04</td>
<td>18.08</td>
<td>11.265</td>
</tr>
</tbody>
</table>

Source: Calculated from estimates made by the C.I.A. and reported in the Monthly Energy Review of the Federal Energy Administration, December 1975 and 1976.

\(^a\) Million barrels per day.

\(^b\) Average for last eight months of 1975.

\(^c\) Includes the last seven producers listed in the table.

\(^d\) Includes the last four producers listed in the table.

\(^e\) These are the excess capacity percentages for the residual subgroup of producers to the subgroup listed in the row label.
capacity utilization more rapidly than others. If the former group of producers can and do expand output capacity rather than delay additions and force marginal demand to go to other cartel members, then the latter group may have a continuing excess capacity burden. Because the expansion of crude oil producing capacity involves exploration and discovery uncertainties rather than calculated capital installation, the coordinated control of capacity expansion may be more difficult than in a manufacturing or an agricultural cartel. In any case, the need to avoid this competitive expansion in capacity to allow the current excess capacity burden to ease requires further coordination by the oil cartel. Several characteristics of the oil market support the development and persistence of producer coordination if the conflict over the choice of a uniform price can be controlled.

a. Concentration and Interdependence

The size distribution of producers and exporters in the world oil market and within the OPEC portion of this market is of a nature that facilitates detection of price cheaters. Table 3-3 presents several concentration measures for the nations in OPEC. The individual entries in the table are percentages calculated by dividing the share of the subgroup identified in the column headings by the relevant market identified in the row labels. Concentration measures indicate one dimension of monopoly power and are used to suggest or test hypotheses about the intensity of competition among existing firms in a given market. When concentration is high, each
<table>
<thead>
<tr>
<th>Market/Measure</th>
<th>OPEC</th>
<th>Arab Subset of OPEC (7)a</th>
<th>4 Largest in OPECb</th>
<th>Persian Gulf Nations c</th>
<th>Saudi Arabia</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. In World</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
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<td>31.4</td>
<td>34.3</td>
<td>36.9</td>
<td>14.4</td>
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<td>Reserves</td>
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<td>50.8</td>
<td>49.7</td>
<td>54.8</td>
<td>23.4</td>
</tr>
<tr>
<td>2. In Free World</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exports</td>
<td>91.7</td>
<td>54.3</td>
<td>59.4</td>
<td>62.7</td>
<td>24.3</td>
</tr>
<tr>
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<td>38.3</td>
<td>41.7</td>
<td>44.9</td>
<td>17.5</td>
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<tr>
<td>Reserves</td>
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<td>60.4</td>
<td>59.1</td>
<td>65.1</td>
<td>27.9</td>
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<tr>
<td>3. Within OPEC</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Exports</td>
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<td>64.8</td>
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<tr>
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<tr>
<td>Reserves</td>
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<td>74.7</td>
<td>73.1</td>
<td>80.5</td>
<td>34.5</td>
</tr>
</tbody>
</table>

Sources: Assembled and computed from data in Bureau of the Mines, *International Petroleum Annual*, various years; *World Oil*, February 15 issue for various years; and the *Oil and Gas Journal*, last issue in December of various years.

a Includes Saudi Arabia, Kuwait, Iraq, Libya, Algeria, Qatar, and the U.A.E.

b For exports and production these four are Saudi Arabia, Iran, Kuwait, and Venezuela. For reserves Iraq replaces Venezuela as the fourth member of this subgroup.

c Includes Saudi Arabia, Kuwait, Iran, Iraq, Qatar, and the U.A.E.

d The ratios in this row are averages computed from estimates for the years 1973 and 1974. Due to lags in data reporting, figures for 1975 were not available by mid-1977.

e The ratios in this row are averages computed from yearly production for the years 1973-1976.

f The ratios in this row are averages computed from January 1 estimates for the years 1972, 1974, and 1976.
of the firms cannot help but recognize that aggressive actions such as price reductions will significantly affect major rivals. Whether, in the end, this will leave the aggressor financially worse off depends on the price makers ultimate goal and on how quickly and in just what way existing and potential rivals react. Uncertainty about the speed and the severity of these reactions may induce all of these firms to exercise mutual restraint so as to avoid the possibility of precipitating a price fall to the competitive level. With low concentration any detection of and reaction to price cutting is likely to be less swift, so the hesitancy about incurring its uncertain effects is reduced.

Unavoidably, there is imprecision about the demarcation between "high" and "low" concentration. In very pronounced cases this fuzziness is less of a problem. A more troublesome problem in using concentration indices comes in defining the industry meaningfully -- leaving out firms which are not competitors and including only those that are rivals. In the world oil market three measures are usually reported.

Proven reserves constitute potential production of crude oil, and therefore form a significant measure of the size and importance of a country or a tightly knit group in the oil market. However, since this indicator is only relevant in the long run, the correct market over which it should be measured probably must include a factor for the sources of energy that will eventually be used in
place of oil. For this reason reserve concentrations say less about the extent of monopoly power in the current market than do oil flows, which are less subject to competition in the short run from other energy sources.

Production concentrations are not entirely satisfactory measures of world market interdependence either. Many countries that are far from self-sufficient in oil production have little prospect for finding more domestic reserves to exploit. Western Europe outside the North Sea and Japan are examples. Since these minor producing areas will always import a large portion of the petroleum that they use, their own limited output only reduces the size of the world market somewhat. Further, since exports from different surplus producing countries are reasonably interchangeable, the world market shares of individual countries that are large oil producers are not threatened by this minor production. Concentration over this dimension probably understates the true quantum of market power in the international oil market because it defines that market a little too broadly.

Export concentration is probably the best market measure, but two modifications of reported exports are necessary. Due to some refining in major oil producing countries, a significant part of the petroleum that flows in international commerce does not ever cross borders as crude oil. Total oil exports must include both crude petroleum exports and net finished product exports if the international oil market is to be accurately delimited. Refinery situs
should not affect the relative importance to the international oil market of those who export oil. Since the product exports reported for various countries includes petroleum that is re-exported after being received from outside sources, these data must be revised to avoid the double counting of some oil when various countries' exports are aggregated. This modification was done for the figures reported in Table 3-3 by deducting each exporting country's imports of crude and unfinished oil from its crude and refined product exports. Since a breakdown of imports and exports by country in the Sino-Soviet bloc is not available, this same adjustment could not be done for these countries. Therefore, a figure for total world exports could not be obtained. An aggregate figure for exports to countries in the free world was obtained by computing the net exports from the Sino-Soviet bloc and adding this to export figures for free world countries.

The two to four year averages used to calculate the concentration ratios in Table 3-3 hide changes over time that have occurred in those measures. The change has been very small during this short period, however. For the purpose of indicating the relative importance of groups in the world oil market, average figures provide a clearer impression than would a matrix three or four time that size containing indices for each year.

According to Scherer the U. S. Justice Department has considered industries where one firm control 50 per cent of the
relevant market or where four firms control 80 per cent or more of the relevant market to have concentration of sufficiently pronounced proportions to expect monopolistic behavior. The oil-export market does not meet the monopoly test of these strict guidelines.

That particular measuring rod applies to industries confined to one national market and in which no explicit agreement among rivals is assumed to exist. OPEC by definition violates the latter condition. An explicit understanding on the limits of competition should make it easier for the sellers in less concentrated markets to sustain a price well above competitive levels. A world wide agreement should further enhance the success of collusion since it reduces the import threat present in the exploitation of national monopolies. In his survey of historical cartels, Ekbo found that 90 per cent of international cartels that were effective at maintaining a price in the monopolistic range for at least four to six years contained four producers that provided more than 50 per cent of the total flow of trade in their commodity. The structure of OPEC meets this monopoly test in terms of the free world export market. The general availability of data from trade journals and various government agencies on crude oil shipments (after a short

36 Scherer, op. cit., pp. 465 and 481-82.

lag), as well as variations in the characteristics of the product from different producers, helps this structural concentration discourage attempts to secretly chisel.

b. **Product Peculiarities**

Several features of oil production ease the burden on member producers of the current excess capacity that monopolization requires. One, crude oil or petroleum products cannot be recovered from scrap and recycled, so refiners are proportionately more dependent upon virgin, raw material inputs than are copper, iron, or aluminum processors, for instance. Two, because oil is liquid, combustible, and consumed in such large volumes, importers can less easily and cheaply stockpile enough of it to meet domestic demand for some months than they can with almost any other internationally traded commodity. The expense and limitations on such an effort should make buyers less resistant to a higher price for oil.

Three, crude production does not use large quantities of local labor inputs. Consequently, high employment considerations in exporter countries are less likely to deter temporary shutdowns or production slowdowns to defend price than they are in countries that export labor-intensive commodities. Fourth, unlike agricultural commodities or manufactured goods, crude oil not produced

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today does not represent a sale that is lost forever. The same barrel of oil that could have been produced and sold today but was not, can be produced and sold at a later time. The nonrenewable nature of the commodity is responsible for this solace to excess capacity producers. There is of course no guarantee that this saved oil will command as high a future price as current production policy banks on. Fifth, a stability advantage is derived from the fact that nationalizations have been accomplished at purchase prices covering only depreciated book or original value. The fixed cost pressure on OPEC nations to produce at high rates therefore is less than it would be if these countries had paid full replacement value prices for their oil producing plant and equipment. These circumstances all serve to ease the pressure to cheat that OPEC members might otherwise feel.

c. Economic Sophistication

Finally, the chiseling attraction in OPEC might be considerably less than in comparably structured and favored cartels due to a difference in perceptions by its leaders. The major participants, the oil ministers of the larger OPEC nations, are graduates of highly rated business schools in the U. S., Britain, or France. As such, they have probably become well acquainted

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39 Osborne, op. cit., p. 841.
with cartel theory. Therefore, they should understand their own roles in the cartel, and in particular, that the economic incentive to chisel on the group price is more apparent than real. Admittedly, noneconomic pressures (not felt by the typical businessman) may prevent oil ministers from avoiding price chiseling, but that does not detract from the fact that they should well understand the long run consequences of such behavior and be very circumspect about attempting to cheat on the group.

2. Disparity Over Permissible Entry

The fact that rivalry and cheating for immediate gain is discouraged by industry structure, production characteristics, and managerial understanding may not eliminate the divisive tendency within the cartel of individual economic incentives. The price set by the group appears to be high enough to attract entry (after a development lag) of new productive capacity into the oil industry and into the energy industry in time.

a. Displacement Prospects

Most OPEC oil production capacity has a significant lifting cost advantage over outside sources. Lifting cost plus the cost of transportation to major market for Middle East oil is estimated at
about $1.50 per barrel (in 1975). The estimate of these costs for non-Middle East OPEC sources is about a dollar per barrel higher.

In contrast, Congressional committee estimates of the (lifting) cost of new crude oil production in the U. S. as of 1973 were $6.73 per barrel for only the continental U. S. or $5.49 per barrel plus transport cost when Alaska is added. Unconventional sources of crude oil, called liquid synfuels, face an even greater cost disadvantage. The U. S. Energy Research and Development Administration estimates that a 50,000 barrel per day shale oil plant could produce crude of quality comparable with Arabian crudes in 1976 for a cost of between $12.50 and $20 per barrel. These cost estimates apparently do not include a factor for environmental restrictions that may be imposed, and thus are probably low estimates. Other synfuel options such as coal liquifaction are reported to be even more expensive.

Though comparisons are more difficult to make, it appears that the cost of development of a backstop technology fuel (uranium) is in the economically feasible range. Professor Houthakker estimates that uranium fuel for electricity generation is available at

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42 "Shale Closest Among Liquid Synfuels," op. cit.
a per barrel equivalent cost of $5 to $7. Regulatory delays and restrictions on the construction of nuclear power plants will impede its displacement of oil, however. Also, the near term threat to OPEC from the conversion to this or other fuel alternative (solid coal or solar energy) is mitigated by one important fact. Even after the development of the capability to exploit these fuels, much recently acquired oil burning capital stock will remain in operation for a substantial period, thus perpetuating a large market for oil.

OPEC seems to have a significant cost advantage over the potential oil and substitute fuel sources that threaten its current market dominance. Given time at the current real price level, energy alternatives can begin to encroach on the market position of the existing OPEC producers. For example, James Griffin reports a long run (20 years) price elasticity of demand for fuel oil inputs to electricity generation of between -2 and -3 in the OECD group of countries.44 Due to the size of OECD in the world oil market (70

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44"Inter-Fuel Substitution Possibilities: A Translog Application to Intercountry Data," International Economic Review (forthcoming). Griffin argues that the smaller elasticities found by others err by allowing for only a one year adjustment period after a price change. His pooled sample is superior because it takes advantage of the fact that different countries have faced different relative fuel prices long enough to allow the stock of energy consuming capital equipment to adjust across countries.
percent of all crude oil consumption in 1973) and the proportion of its oil consumption devoted to electricity generation (between 30 and 40 percent in the early 1970's), oil may be displaced by the late 1900's from a significant portion of its current market.

On the supply side, non-OPEC oil sources appear to have the potential to increase production substantially. For example, Professor Houthakker cites estimates that the U. S. may hold untapped domestic petroleum reserves as large as 100 billion barrels in partly depleted oil reservoirs or in reservoirs no longer capable of production using technology largely developed with the effort elicited at the pre-1974 price level.\(^{45}\) The recent higher prices will lead to considerable investment in new knowledge about the earth's crust and about better extraction methods which will pay production dividends mostly in the long run, also.

These entry prospects must be tempered by the recognition that alternative oil and energy producers that would compete with OPEC face two sources of downside risk. One, there is the risk to high cost entrants that once OPEC begins to suffer from outside competition it will cut the cartel price to a point below the cost of production by the competition. Members can profitably maintain

\(^{45}\)Houthakker, op. cit., p. 16. Current geologic estimates by one oil company (Mobil) put total recoverable reserves in the non-communist world at 1.55 trillion barrels, of which only about 300 billion barrels has been consumed by 1977. The Oil and Gas Journal, April 18, 1977, pp. 36-37.
prices just below the cost of these alternatives for a period that will probably bankrupt the non-OPEC producers. Two, the companion risk is that the cartel will collapse under the entry pressure and market competition will force fuel prices below the cost of the crude oil alternatives. The conversion of capital stock that must accompany fuel conversion provides some protection to non-oil alternatives. Also, discussions about oil floor prices in major consumer countries indicates that OPEC may not be allowed to threaten competitors with deliberate price reductions.

If entering producers can insure against these risks, OPEC should come under mounting pressure to moderate the price it sets. If the new fuel producers remain outside the cartel, as they have the incentive to do, the collusive group must accept a decline in its market share in order to sustain the chosen price or price path. Should the new capacity seek to join the cartel, the internal policing problem for the collusive group would be aggravated as would any persistent over capacity burden on the original members. Due to differences among the nations in OPEC, either prospect may have a detrimental influence on the economic stability of a cartel selecting a price above the level of \( P_1 \).

\[ \text{46 Outside producers get the full benefit of the higher price set by the cartel without paying any of the cost (by way of reduced output) of maintaining it.} \]
b. **Limit Price Differences**

The limit price analysis conducted earlier in this chapter indicated that either of two producer characteristics may lead to different economic preferences about the choice of a uniform price level. One characteristic identified was the individual producer's time horizon. A standard indicator of this factor is the current reserve/production ratio of the producer. It probably should not be interpreted too literally since either or both of its components will usually change over time. Assuming that the various producers expect to experience about the same proportional change in these components, however, it does serve as reasonable indicator of relative time horizons. Table 3-4 reports average reserve/production ratios for the eleven main producers in OPEC over the 1974-76 period.

Another differentiating characteristic identified earlier was the variation in discount rate. Previous discussion tied this factor to the absorbing capacity of the domestic economies in the producing countries. Exporters with high absorber economies are expected to apply a greater discount rate to future profit than are exporters with low absorber economies. A logical indicator of absorptive capacity would seem to be the per capita oil revenue of the producer country. Governments of nations with smaller per capita oil incomes probably have more domestic pressure for spending on internal projects and thus should have a higher rate of time preference for oil revenue than should nations with relatively small populations. Table 3-4 reports
### TABLE 3-4

LIMIT PRICE VARIABLES FOR ELEVEN PRODUCER COUNTRIES

<table>
<thead>
<tr>
<th>Country</th>
<th>(Reserve/Production)</th>
<th>Average Annual Oil (Revenue/Population)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saudi Arabia</td>
<td>49</td>
<td>$3,926</td>
</tr>
<tr>
<td>Kuwait</td>
<td>89</td>
<td>$7,397</td>
</tr>
<tr>
<td>U. A. E.</td>
<td>49</td>
<td>$26,218</td>
</tr>
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<td>Qatar</td>
<td>34</td>
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<td>Libya</td>
<td>43</td>
<td>$2,327</td>
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<tr>
<td>Iran</td>
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<td>Venezuela</td>
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<td>$644</td>
</tr>
<tr>
<td>Indonesia</td>
<td>26</td>
<td>$26</td>
</tr>
</tbody>
</table>


*a* Average for the figures for the years 1974-76.

*b* Average for the figures for the years 1974-75.
average per capita oil revenue for the same eleven countries as it does reserve/production ratios.

The coincidence of relatively low absorptive capacities and relatively high reserve/production ratios of the first four or five nations listed should lead them to prefer a rate of entry or development of alternatives slower than that preferred by the last six or seven nations listed. If the cartel can be split into two subgroups, a saver group led by Saudi Arabia and a spender group led by Iran and Venezuela, the significance of the difference in these two dimensions can be more concisely brought out and related to the duopoly analysis developed earlier. The Saudi Arabian subgroup, consisting of the Arabian Peninsula sheikdoms plus Libya, has a composite per capita oil revenue of $4500 annually (implying a relatively low discount rate like $r_z$) and a reserve/production ratio of 53 years (implying a distant time horizon like $S$). The spender subgroup has a composite per capita income of $174 annually (implying a relatively high discount rate like $r_w$) and a reserve/production ratio of 27 years (implying a shorter time horizon like $R$). The combination of $R < S$ and $r_w > r_z$ imply that both variables increase the saver groups preference for the limit price relative to the preference of the spender group.

If substantial utilization of coal, solar, and nuclear energy is or appears likely to be made by energy consumers and/or if significant additions to non-OPEC oil production capacity are
made during the 1980's, OPEC may be forced to trim its real price. Should the oil cartel be obliged to lower the price level it sets for crude oil very much, saver countries will have made a greater economic sacrifice to defend the current price than will have the spender countries. Saver countries will have more oil sales left to make at the lower limit price path. Also, saver countries may have grown enough to use all of their oil proceeds, thus providing a more intense need for oil income that is received in this future period. The shorter time horizon and a higher discount rate combine to make the economic significance of a future price adjustment less important to spender countries. Consequently, profit maximization considerations (viewed in a long term framework of limit pricing rather than in the short term framework of chiseling) can drive a wedge between the interest of different members or subgroups in the oil cartel.

One change in the nature of OPEC may have much to do with how well the cartel overcomes this economic disagreement about the proper price level and the disruptive potential it generates. During the last few years a large and growing proportion of productive capacity has been nationalized by the member status of OPEC. In preparation for a theoretical treatment of the effect this proprietary change might be expected to have on the behavior of the cartel, Chapter Four reviews the rationale and progress of nationalization by the oil-exporting countries.
CHAPTER FOUR

THE CHANGE IN OWNERSHIP OF OPEC OIL PRODUCTION

Traditional economic considerations of producer interest and cartel stability and behavior are not entirely adequate to analyze OPEC prospects. During the late 1960's and early 1970's governments in most oil-exporting countries began acquiring ownership of at least some of the crude oil raised from their territory. The large oil price increases during the early and mid-1970's were achieved by the OPEC cartel while most of its members shared the ownership of their indigenous oil operations and thus the profits with the international oil companies. The mechanism used by host governments to elevate and fix prices under this combined ownership condition involved a complicated mixture of as many as four prices for each barrel of oil extracted from the ground and induced company compliance in sustaining the price established by the cartel. One purpose of this chapter is to explain this pricing system and the way it was used to increase the price of crude oil.

By January, 1977 five OPEC governments had concluded the nationalization of all of their domestic crude oil production. The other eight members have reached various intermediate stages in achieving complete national ownership of local production operations. Removing the international oil marketing companies from crude oil ownership in OPEC ends the use of a system that had proved successful
at permitting members to monitor each others' selling price and at tying oil company interest to that of the producing companies. Also, government takeover of production introduces political and international relations objectives more directly into the pricing and output decisions made by cartel members. By explaining the institutional changes in the pricing system associated with this proprietary change, this chapter provides a basis for the theoretical interpretation of the consequences of nationalization for cartel performance.

A. How Oil Prices Work

The joint ownership of oil properties resulted in a dichotomization of each barrel of oil. Equity oil is that portion of the total oil lifted that the international producing companies such as Exxon or Texaco own. Until the 1970's all of the oil produced in most countries was of this type. Participation oil is the portion of the total oil lifted that is owned by the producer countries such as Saudi Arabia or Iran. In the Persian Gulf participation oil at first was 25 per cent but has since grown to 60 to 100 per cent of all oil produced. The current equity and participation portions in each of the OPEC nations are detailed in a subsequent section of this chapter.

1. World Oil Price Relationships

Each quality of oil produced bears its own posted price. Crude oil from one reservoir is usually of somewhat different quality
and value than that from any other. For instance, a barrel of high-gravity or light oil is usually worth more than a barrel of low-gravity or heavy oil at the same location. The difference results from the facts that it generally costs less to produce gasoline from light oil than from heavy oil and that gasoline is one of the more valuable end products of petroleum refining. High sulfur content makes for more refining expense to produce a fuel oil derivative environmentally acceptable in some places, so other things equal, low sulfur oil tends to be more valuable than high sulfur oil. Oil produced closer to market carries a higher well-head price than more distantly produced oil, which must bear a larger transportation charge. To provide an idea of the size of the variations in price, Table 4-1 lists a sample of the posted prices applying at various times since 1970 for some of the more important crude oils produced in the world.

The posted price is not an actual sales price for OPEC oil. It is only an artificial creation on which taxes and royalties that apply to the equity oil are based. By shifting all market risk to the companies it provides these governments with a predictable income regardless of fluctuations in the selling price. All of the other prices that apply to OPEC crude oil are derived from the posted price, the level of which has been unilaterally set by the producer countries since 1973.

1Producers nearer the market thus receive relatively more rent per barrel than do more distant producers.
### TABLE 4-1

**KEY WORLD CRUDE OIL PRICE POSTINGS**  
*(dollars per barrel)*

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<thead>
<tr>
<th>Source-Type</th>
<th>8/31/70</th>
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<th>1/1/73</th>
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<th>10/16/73</th>
<th>1/1/74</th>
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<th>11/1/75</th>
<th>1/1/77</th>
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<td></td>
<td></td>
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^aEffective 11/1/73.

^bEffective 2/1/74.

^cState sales price in parenthesis. In the Persian Gulf it is usually 93% of the posted price; in other areas it is set at different proportions of posted price. After the countries achieve complete nationalization of their oil, as Kuwait and Venezuela did at the beginning of 1976, the tax reference or posted price has no meaning so it is dropped.

^dComposite of 60% old and 40% new oil at prices of $5.20 and $13.35 respectively.

^eComposite of 60% old and 40% new oil at prices controlled from 3/1/76 at $5.25 and $11.53 respectively.
One location, the Persian Gulf, supplies some crude oil to all the regional markets in the non-Communist world. Spare capacity sufficient to replace a total denial of oil from this source does not now exist elsewhere in the world. In the absence of price controls or quantitative restrictions, the landed price of oil in each region from all sources must be approximately equal (except for various quality premiums or discounts). Consequently, all prices must be related to the price from this one area. 2 During the last few years a combination of ownership levels and several kinds of prices have been used to set the composite price of Persian Gulf oil. An example using the (marker) crude oil upon whose price the other OPEC prices are based, Saudi Arabian light crude 34° (which is the principal export of that country), is the best way to illustrate how prices in this region have been set. 3 For the period November, 1974 to November, 1975 the posted price of this particular oil was set at $11.25 per barrel, f.o.b.

2. Mechanism for Maintaining Price

The price at which Saudi Arabia and other producers sell their participation oil directly abroad, usually to European state oil

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2 This interdependence of world oil prices despite the absence of a centrally located commodity market, as is found in say wheat or copper, is carefully pointed out by Houthakker in The World Price of Oil: A Medium-Term Analysis (Washington, D.C.: American Enterprise Institute of Public Policy Research, October, 1976), pp. 2 and 6.

3 The following explanation is gleaned largely from information in the New York Times, "How Oil Prices Work: Ownership Level Vital," November 12, 1974, p. 59; the Oil and Gas Journal, "OPEC Crude Oil Prices to Rise Jan. 1," December 23, 1974, pp. 15-16; and
companies, is called the state sales price. During 1975 this was set at 93 per cent of posted price, or $10.46 per barrel for Arabian light. Since the producing countries lack the marketing outlets and long term contracts to dispose themselves of all of their participation oil, they set a price at which the international oil companies producing in their country must buy back the unsold portion of the participation oil. For 1975 this buy-back price settled at 93 per cent of the posted price, or also $10.46 per barrel of Arabian light.  

The price of equity oil is determined by the international oil companies, but is carries a tax floor cost imposed by the countries which keeps this price in line with the ones applying to participation oil. The tax liability per barrel of equity oil is calculated as follows. Royalty payments (20 per cent of the posted price) and production costs (a reasonable estimate is about 25¢ per barrel of Saudi crude) are deducted from the posted price. An income tax rate (85 per cent in 1975) is applied to this difference to get the net income tax owed per barrel. With the 1975 posted price this resulted in a tax and royalty on each equity


4The buy back price was initially set at 94.8 per cent of posted price, or $10.66 for this period. By March 1975 it had been rolled back to the level of the state sales price.
barrel of Arabian light of $9.69. When production cost and some company profit are added the resulting price is about the same as on participation oil.

A table using the approximate proportions of each type of oil sold in 1975 can be used to illustrate why refiners paid in the vicinity of $12.00 per barrel of Arabian light, and why the Saudi government made about $10.15 on each barrel of that quality of oil produced. See Table 4-2 for these calculations. Note the fixed dollar amounts that apply to each of the three components of the government take per barrel.

This scheme, by establishing a fixed amount royalty and tax payment, such as $9.69 per barrel on the equity portion of Arabian light crude oil, imposes what is really an excise tax. Although it nominally involves a percentage royalty payment and a percentage income tax, and was so recognized for foreign tax credit purposes by U. S. law until June 30, 1978, the operating companies cannot reduce the amount of this tax by cutting price and making less income. In combination with the fixed price and proportion for participation oil, this tax system creates an effective floor to the price that can be charged for Saudi Arabian light oil (and through replication, other OPEC crudes) entering international commerce.

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5A January 16, 1978 ruling by the Internal Revenue Service ended the companies' right to deduct these foreign tax payments from their U. S. tax obligations. Facts on File, January 1 - March 31, 1978, Facts on File Incorp.
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<td>2) Buy-back sales at $10.46 per barrel</td>
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<tr>
<td>3) royalty and tax at $9.69 per equity barrel</td>
<td>40%</td>
<td>3.88</td>
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Average Saudi take per barrel $10.15

4) production cost and producer company profit on equity portion (estimate) .60

5) transportation cost to U.S. 1.25

Price to refinery $12.00*

Source: See text

* With 42 gallons per barrel this works out to a price of just over 28.5¢ per gallon of crude oil.
3. Pecuniary Incentive to Nationalize

Since government take is higher on the participation oil (93 per cent of the posted price) than on the equity oil (about 86 per cent of posted price), there is the incentive under this system for host governments to increase their participation in local oil operations. The seven percentage point difference in these two revenue figures seems to overstate the gain to host countries from their takeover of 100 per cent ownership of the local affiliates of the international oil companies. With both equity and participation oil, the companies are forced to recover the production costs (about 25¢ per barrel of Saudi oil) for all the oil that is lifted in the price they charge for the equity portion only. After complete takeover of these operations, the local owners must assume at least the variable portion of the costs involved in the production of their crude oil. Even if local managers cannot conduct the operations as efficiently as the company managers did previously, the governments can and do hire the previous companies under service contracts to continue to conduct the operations for a fee approximating production costs. For example, the Wall Street Journal, April 5, 1976 reports that the companies that will be pushed out of ownership of oil production in Saudi Arabia will continue to operate these facilities at a contract fee of 21¢ per barrel.

B. Primer on Nationalization

Even before the evolution of this pricing system and its modest economic incentive for 100 per cent participation, the OPEC
nations sought to take over the oil operations in their lands. During the nascent period of local oil activity, each of the countries that now make up OPEC had to offer very attractive concession terms to entice exploration and development by competent outsider operators. These less developed countries (LDC's) had neither the skills, capital, nor access to markets to develop their resource base. For their part the international oil companies could justify very generous concession terms. These high payoffs were to compensate for the risks of oil exploration in foreign countries and the cost of oil development and related activity in remote regions. In many cases the companies had to provide capital not only for oil operations but also for the construction of basic infrastructure like port facilities, roads, and water systems before any oil deposits could be exploited. In time the bargaining leverage that gave rise to these liberal concessions shifted against the companies, however.

1. Reversal of Bargaining Advantage

After large discoveries had been made and profitable operations established within the host country, two factors changed. First, exploratory risks were no longer as high as they had been at first, uncertainty about the structure of production costs was reduced, and essential infrastructure investment had been made.

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As a result, other foreign investors were willing to accept less attractive terms. Second, the initial investments that became successful were, by the nature of extractive production, made in large discrete lumps. As such, they became potential economic hostages and reduced the flexibility of the company with regard to alternatives.

Faced with the potential of alternative operators and burdened with a large sunken investment, the original companies were willing to accommodate less attractive terms from the host government rather than pull out. The emergence of a large number of "independents" with the capability to conduct international oil operations undoubtedly were keys to this effect on the relations between the oil "majors" and the OPEC governments. The simple revision of concession terms usually does not satisfy host governments, though.

2. Pressure for Local Government Control

Direct foreign investment, in the form of a multinational oil company, is inevitably perceived as a challenge to the national sovereignty of the host countries. Though they do provide otherwise unavailable economic benefit in the form of factor payments to locals, training to domestic workers, and tax revenue to
the host government, these foreign owners also impose political costs. The costs center on the actual or potential exercise of control over the national economy that is acquired by the foreign parent companies and by the home governments of these parent companies. Companies that operate throughout the world can award or deny scarce capital and technology to individual countries and can shift production from one country to another. A demonstration of this potential occurred when the oil majors curtailed exploration and production in Iraq in the 1960's because of the instability and turnover in governments and made up for lost oil by producing more in other Persian Gulf countries.

Home governments to the parent companies of the local producing affiliates can also interfere in the host national economy. These foreign governments may, for instance, constrain the foreign operations of the parent companies in order to carry out policies regarding say antitrust law or East-West trade. No national government, jealous sovereign that it is, cares to have an important part of its economy subject to control by decision centers located beyond its reach. Premature seizure of this control, however, is restrained by the high economic cost of such action.

8 This cost/benefit approach is presented in Franklin R. Root, *International Trade and Investment* 3rd Ed. (Cincinnati: South-Western Publishing Co., 1973), Ch. 25.

a. Takeover Preparation

Until native expertise is gained, the takeover of oil operations risks alienating nonreplaceable foreign know-how and access to markets, and with that a major current source of income. T. H. Moran suggests that in LDC's there is a high "esoteric value" placed on the services provided by the foreigners.\textsuperscript{10} Domestic skills and confidence in the ability to run the export industry only slowly increase and dispel the ignorance and mystery surrounding capital-intensive mineral extraction. Also, as happened in Iran in the early 1950's, isolated attempts to completely expropriate oil company property face the threat of boycott by buyers who can get their supplies from less aggressive, rival countries.\textsuperscript{11}

With time, and the demonstration effect of the value of skills in production, transportation, and marketing that is provided by successful foreign ventures, basic native expertise is accumulated. If the other producing countries will imitate a domestic takeover, or will at least prevent an offsetting increase in production from their oil fields, the boycott threat to the expropriating country is also reduced.\textsuperscript{12}


\textsuperscript{12}This value of producing country unity is pointed out by Erickson and Waverman, \textit{op. cit.}, p. xxii. Extending this reasoning, one would expect that once home takeover of foreign investment has been completed, some of the benefit of belonging to the producer
capability and support, the economic cost of seizing local oil operations is reduced, sooner or later, below the perceived political cost of the failure to do so. The inevitability of domestic takeover of natural resource properties is a common conclusion reached by the authors cited in this review discussion.

b. Public Takeover

In all OPEC nations this domestic takeover has been in the form of nationalization by the host government, rather than in the form of acquisition by private interests. Nothing said so far accounts for this particular form of native takeover. Viable reasons as to why a public acquisition is effected can be suggested. First, natural resources, in post-colonial developing countries especially, are regarded as a national heritage that belongs to the whole native population. With this guiding philosophy, it is easily arguable that the government, as the institutional extension of the people, should administer the utilization of this heritage. No private party whether domestic or foreign has as much moral claim to control of the public resource deposit as the national government. Further, native private parties may lack the level of oil skills that have been acquired by the bureaucrats of host governments through their taxing duties. The loyalty of competent foreign group will be lost. If other costs and benefits of the group are unchanged, the glue holding the organization together should be less sticky as a consequence.

13 Root, op. cit., p. 627.
owners, who might agree to become domestic corporations and citizens, would always be in doubt.

Second and more generally, politicians in the host countries can be expected to maximize their power to do what they perceive to be in their country's interest. In nations where oil constitutes such a dominant part of the economy, as with those that belong to OPEC, economic power rests with those who control oil revenues. The turnover of such power to private nationals would entail some sharing of this power, in the form of whatever oil revenue is not taxed. This condition is not consistent with the goal of the politician. Government takeover thus seems to be the most likely way in which the domestic control of extractive properties in LDC's will be accomplished.

C. Progress of Nationalization in OPEC

Early attempts at wholesale nationalization of oil company holdings met with and succumbed to the exclusion of the perpetrating country from the world oil-marketing system. Mexico in 1938 and Iran in 1951 seized the foreign owned oil properties under their respective jurisdictions. In both cases concerted exclusion of that country's crude by the international oil companies succeeded in reimposing foreign company control over the oil produced in these countries.\(^\text{14}\) By the late 1960's though, important members of OPEC had gained sufficient bargaining strength to begin a more

\(^\text{14}\) Sampson, op. cit.
successful nationalization of company assets. This section outlines
the extent of nationalization through 1976. The purpose is to show
the degree to which OPEC has become a cartel composed of national
enterprises, that is, a political-economic cartel in the sense to
be considered in this study.

The North African oil-exporting countries have used the
most radical nationalization schemes of any OPEC nation. In 1967,
right after the Six Day War, Algeria seized the non-French oil
companies and in 1971 confiscated properties responsible for two-
thirds of the output of French oil companies operating in the
country.\(^{15}\) It has been held back, however, from completing the
takeover arrangements because of technical difficulties resulting
from the shortage of a trained native staff. Libya nationalized the
holdings of British Petroleum (BP) in late 1971, and in 1973 it
nationalized the holdings of BP's American partner and seized 51 per
cent interest in the properties of all the other foreign companies
operating in the country. Libyan refusal of an offer by Occidental
Petroleum to sell out in 1975 indicates that it also is not yet
ready for full takeover. The ability of these two countries to
escape company retaliation for their early and rash takeovers was
due in part to their oil's high quality (light crude with low sulfur

\(^{15}\)Except where otherwise specified, the sources of national-
ization information on individual countries is either, Joseph A. Yager
and Eleanor B. Steinberg, Energy and U.S. Foreign Policy (Cambridge,
content) and to the heavy dependence of Europe on this source. The closed Suez Canal made Persian Gulf crude more costly to transport, so that North African oil was much more profitable for the companies to use, even if it did validate expropriation.

Iraq also began a successful nationalization program in 1967. In 1972 it seized the concession of the Western-owned Iraq Petroleum Company, which operated in the northern part of the country. After the 1973 Middle East war, the government took 38 per cent of the Basrah Petroleum Company, the last Iraq oil operation owned by foreign companies. That percentage was accomplished by nationalizing the Mobil and Exxon shares and 60 per cent of the Royal Dutch/Shell share. Subsequently the financial stake of the government rose to 77 per cent when it took over a 5 per cent share belonging to an individual and 60 per cent of the remaining 57 per cent still in foreign hands (BP and CFP -- the French equivalent of BP -- each had 23.75 per cent and Shell had 9.5 per cent). In January, 1976 Iraq assumed full state control of the Basrah Petroleum Company and the Khor-al-Amay oil terminal at the head of the Persian Gulf, with a promise of fair compensation later.

In Iran a 1954 agreement between the Shah and a consortium of foreign oil companies recognized the country as the legal owner of its oil reserves. The companies, however, retained the right to determine production levels. A 1973 agreement gave the National Iranian Oil Company (NIOC) the power to set production targets and restricted the companies to the roles of purchasers of oil and
of performers of services under contract to NIOC. Thus, complete state control in Iran must be dated from 1973.

Venezuela began to use state contracts with private companies, rather than concession agreements, in the 1960's to explore new oil fields. The government nationalized exploration and production of natural gas in 1973 and achieved complete control of the older crude concessions and producing assets of foreign operators in essentially one step on December 31, 1975. The companies were promised compensation totalling about $1 billion and were given contracts calling for technical assistance fees in the range of 15 to 21 cents per barrel for subsequent production.

In Indonesia the state oil company, Pertamina, has long held the rights to explore and exploit the country's petroleum reserves, but it shares these rights with foreign companies on a contract basis. Unlike the policies in other OPEC nations, the government allows contractors to recover their costs before profits are divided, and so uses elements of free enterprise to encourage exploration and development. Indonesian oil reserves are, however, fully nationalized.

The slogan "participation" has been adopted as a general term for the step-by-step nationalization route employed in most oil-exporting countries. More properly, it denotes the special form of gradual and negotiated expropriation that has taken place in the Persian Gulf countries. Saudi Arabia, Kuwait, Abu Dhabi, and Qatar, as well as non-OPEC countries Oman and Bahrain, had all achieved
60 per cent participation in their domestic oil operations by the end of 1975.

In January, 1976 Kuwait announced its takeover of the remaining 40 per cent foreign interest in the Kuwait Oil Company in an agreement taking effect from March 5, 1975. Terms for BP and Gulf Oil included compensation of $50.5 million and the opportunity to buy 0.95 million barrels of oil per day (MBD) for 5 years at 15 cents off the government's official selling price (with up to 60 days credit) and the opportunity to buy not less than 0.4 MBD for 5 further years. Kuwait, with most of its oil already discovered and sufficient native experience for the relatively more limited scope of its oil industry, had less need for further outside help. This circumstance seems to explain its relative advantage over other Gulf States when it came to timing nationalization.

Complete Saudi Arabian takeover of the assets of Arabian American Oil Company (ARAMCO) -- which is jointly owned with four American oil companies -- had not been finalized by the end of 1977, though "handshake" terms had been settled. The heavy Saudi dependence on ARAMCO (the only Middle East oil consortium with a fully developed corporate structure of its own), both for more oil development and marketing outlets for its huge output and for

general economic development services, is largely responsible for its more extended takeover process.

Abu Dhabi and Qatar are both lagging in completing takeover because of insufficient native expertise to handle their own operations, even with the aid of outside technical services and personnel. The latter country has announced plans for full nationalization, though. Dubai and the smaller states in the United Arab Emirates (U.A.E.), which have just started oil industries, have as yet expressed no desire even for participation. The dominance of Abu Dhabi in the U.A.E. can probably be expected to lead the rest of this federation into more and more national control as those reserves are developed, however.

The newness of oil operations in three OPEC members -- Nigeria, Ecuador, and Gabon -- makes these countries too heavily dependent on outside help to achieve more than partial control of their outputs for several years yet. Mexico, which hopes to become the next member of OPEC, already has a state monopoly on production. 17

In summary, five countries had achieved complete nationalization or 100 per cent participation by mid-1976 -- Iraq, Iran, Venezuela, Kuwait, and Indonesia. Further, the preponderant OPEC exporter, Saudi Arabia, will achieve that status momentarily. Four

other states — Algeria, Libya, Abu Dhabi, and Qatar — own and control a large majority of the oil produced from their lands. Three members — Nigeria, Ecuador, and Gabon — own substantial, though smaller portions, of the oil lifted in their lands. Only the lesser states in the U.A.E. do not yet subscribe to nationalization or participation arrangements. The clear impression is that OPEC is progressively becoming, if it is not already in all important aspects, a cartel of state-owned companies.

D. Influence on Cartel Operation

By eliminating the production of equity oil, the nationalization of domestic operations by OPEC countries greatly simplified the system by which the price of various members' oil is determined. In addition to terminating the need to present a joint front to prevent oil companies from boycotting crude from individual countries that take over local oil properties, nationalization may destabilize the oil-export cartel in two ways.

1. Loss of a Price Monitoring System

When the exports of OPEC nations consist of both equity and participation oil, the cartel price is floored on the fixed formula tax liability of the producing company. In the example of the previous section this formula yielded a $9.69 per barrel tax cost to the operating company. Even in these relatively authoritarian countries, the established tax laws (which resulted from compromises among factions and which are part of the public record) are probably
harder to change than prices. Moreover, company tax payments are
easier to monitor than purchase payments, which involve often com-
plicated installment terms. This formal price supporting structure
would remain intact if private domestic parties replaced the inter-
national oil companies as owners of local oil operations in OPEC
countries.

After the producer countries nationalize production, they
begin setting prices which do not have the floor of clear tax
payments. Compliance by particular countries, which may be
attracted by the prospect of larger current sales at lower price,
is less certain because no tax laws would be violated by covert
price cutting. Also, since the major companies typically have had
equity holdings in more than one member country, OPEC nations have
had a lever to gain indirect access, through common equity
partners, to actual transfer prices for oil produced in other
countries. When oil companies have no equity stake left, they
have less to lose from refusing to provide information on a
potential cheater. The government cartel would be left with only
its own bureaucracy to enforce the established price in each
transaction when international companies begin making undivulged

18 Gerard M. Brannon, Energy Taxes and Subsidies (Cambridge,
the oil minister of Saudi Arabia, has expressed concern over the
loss of this feature contained in the old pricing system.
purchase payments rather than standardized tax payments for the oil they receive. Thus, to the extent that tax laws are harder to change and easier to administer than are selling prices, the act of nationalization increases the exposure of the cartel price to market pressures. Moreover, excluding the multinational oil companies from sharing in the profits derived from production in one country increases the willingness of the main purchasers of crude oil to buy from alternative sources that may offer better terms.

2. International Oil Company Interests

This proprietary change may not completely separate the interests of the exporting countries and the international oil companies regarding the price of crude oil. Three considerations can dampen the incentive of the companies to price shop after their equity stakes in the oil of one country have been liquidated. First, the access to a portion of the oil exports of one country at slightly favored prices (for instance as Gulf and BP have to Kuwaiti oil) can have the same kind of an effect as a small equity share in tying companies to individual countries. Nationalization terms that award a former producing company preferential prices make it more in that company's interest to preserve a price structure that grants an input cost advantage over its major rivals.

Second, for fear of sudden price falls, the international oil companies may not aggressively exploit weakness in this cartel of state owned enterprises. Leif H. Olsen suggests that these companies have a vested interest in not seeing the price of oil come down suddenly. This development may force the vertically integrated companies to sell a lot of their in-process inventory, which was bought at high cartel prices, at lower competitive prices. This reverses the situation that gave these companies their astronomical profits in 1973 and 1974. Fried further suggests that, without greater competition than now exists among the major international oil companies, they may actually act to shore-up the weak price in an unstable market. Apparently, this sort of activity occurred in the soft oil market of the 1960's, when the companies informally allocated production quotas among producer countries in the absence of OPEC's ability to do so formally.

Third, the complete nationalization by OPEC of the known low cost oil producing properties in the world makes the "majors" as well as the "independents" rely on non-company sources for most of their cheap crude oil inputs. This situation may tend to make these companies pliable to the wishes of an organic or unified OPEC, much as the original "independents" were to Libyan demands in

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21 Fried, op. cit., pp. 13 and 269.
The crucial assumption in this presumed subordination of company actions to OPEC wishes is that the OPEC nations operate as one in dealing with the unattached oil companies. Without this solidarity the companies have the opportunity to shop around among several suppliers for more favorable terms. The original "independents" had only Libya to deal with in 1970, since the "majors" owned most of the rest of the Middle East oil deposits.

Despite the possible doubts about the interest of the international oil companies in pressuring OPEC to reduce price, the oil market relationship has been changed by nationalization. The oil companies have shifted their emphasis away from the disposal of profitable crude oil toward the procurement of crude oil for their refining and marketing operations to run at a profit. OPEC must begin to function as a cartel without the direct benefits of company support and without the monitoring facility of a tax system. Hence, discussions about OPEC price control focus on the collusive motives of the membership and the capability to maintain price discipline. Chapter Five assesses the robustness of the

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22 The pliability in both cases is based on the fact that the companies have huge capital investments in tankers, refineries, and marketing outlets which must be fed by oil from these major world sources. If this oil is withheld, losses to competitors and stockholder displeasure quickly threaten the job tenure of company managers.

23 Exxon asserts that aggressive price shopping by oil companies have caused considerable fluctuation in the production levels of several countries. *OPEC: Questions and Answers* (New York: Exxon Corp, 1976), pp. 25-27.
economic stability of OPEC as outlined in Chapter Three in light of
the noneconomic concerns that become more significant in cartel
decision making following nationalization.
CHAPTER FIVE

THE INFLUENCE ON NONECONOMIC FACTORS ON OPEC DURABILITY

Governments have long participated in international commodity agreements and export cartels. Their role has typically involved such activities as monitoring prices, storing excess output, and/or enforcing quotas for the domestic, private producers in the coalition. The participation of states probably introduced some nationalistic and political concerns into the behavior of private groups. Where all of the domestic producing capacity is owned and operated by the national government, noneconomic motives should play a more central and decisive part. Political and state goals no longer have to be furthered by trying to indirectly influence the private owners of the export businesses. The term political-economic cartel, or PEC, will be used to refer to an export cartel where the producing facilities are owned and operated by various sovereign governments.  

To provide a framework for analyzing the distinctive nature of a PEC, we may note that the ownership of member enterprises by national governments produces three characteristics that are not found generally in economic coalitions. One, nonpecuniary rewards

1 OPEC after nationalization is the most prominent example of this public enterprise cartel. Participation arrangements by members of the International Bauxite Association appear to have started converting this group into a PEC also. For details see C. Fred Bergsten, "A New OPEC in Bauxite," Challenge, July/August, 1976, pp. 12-20.
become an important element in the utility functions of the decision makers in the monopoly. The term nonpecuniary will be used to refer to rewards not received in the form of money profits or salaries. Unlike the situation considered in managerial discretion models of firm behavior, these rewards can have significance both to the (political) managers and to the owners (the national citizenry) of the enterprise.

The second distinctive feature of this type of cartel is that its members are each sovereign unto themselves. There is no law to limit, abridge, or deter collusion among the participating firms in the interest of social efficiency or welfare. Also, no authority exists which has the power either to arbitrate disputes between the independent producing entities or to enforce their compliance with the cartel agreement. Unlike private firms and cartels, these government enterprises have the more complete freedom to compete or monopolize without fear of or recourse to outside authority.

Finally, external issues can alter the willingness of member enterprises to join and conform to the agreement. External issues are international situations which are unconnected to the collusion among the cartel members, yet may modify the incentive of the various firms to act in an economically concordant manner. These factors can be important because the member enterprises are part of an institution that responds to political and cultural as well as to economic stimuli.
To further narrow its scope, the following analysis will concentrate on the effects that these three conditions can have on the conduct of individual members, rather than on the conduct of an organic cartel. Professor Machlup makes the distinction between cartels governed by direct democracy where members not only negotiate on the cartel agreement or "constitution" but also negotiate on particular cartel decisions such as changes in price, and representative democracy or oligarchy cartels where committees or one or two firms make the latter type of decision for the whole group.\(^2\) The fundamental difference for this analysis is that in a cartel run by other than direct democracy, members come to accept the organization as datum and orient their individual decisions toward maximizing their interests within rules set by the group. Under a direct democracy government, all cartel rules and even the permanence of the collusion are subject to constant negotiation among the membership. Machlup concludes that where members jealously guard their autonomy, a direct democracy view of the cartel is most appropriate.

By applying this approach to OPEC we assume the political sovereignty of the oil producers rather than the dominance of Saudi Arabia is the most important characteristic of this cartel's management. Though Saudi Arabia has more than double the proven reserves

of any other OPEC member and is the largest producer and exporter in the cartel, its ability to alone dominate cartel price and output decisions is limited. In particular, it may have the power to moderate price increases that further endanger its own future profits, as it did with some difficulty in 1977. But a solitary Saudi effort to significantly lower the current cartel price toward a level that would more surely delay entry into the energy market could be expected to generate more determined opposition from the other members. There is a difference between treating the Saudis as the most powerful party in OPEC negotiations and treating them as the dominant party making decisions that are consistently accepted by the rest of the membership. Hence, it seems appropriate to explore the role of noneconomic interests in the process of negotiation, compromise, and agreement among the several firms in the PEC, rather than concentrate only on the role of noneconomic factors in the Saudi decision function.

The purpose of this chapter is to explore what effect non-pecuniary management goals, sovereignty, and external issues might have on the ability of a group of sellers to compromise divergent pricing interests and to suppress cheating that dissatisfaction might inspire. In essence, the following analysis enumerates some contributions the above three characteristics can make toward the success of the recurrent bargaining activity among members of a direct democracy cartel. By applying the resulting insights to OPEC it is possible to describe ways in which political elements
aggravate and ways in which they alleviate the conflict over the limit price -- monopoly price choice raised by differences in the time horizons and time preferences found within this oil cartel.

A. The Role of Nonpecuniary Rewards

Nonpecuniary rewards can play an important role in the operation of public enterprises for several reasons. These firms are created and managed by people and thus reflect the interests and attitudes of the individuals that are powerful in them. The huge salaries, bonuses, and dividends that often accrue to leaders of successful private firms may be deemed unseemly and even unnecessary to elicit and compensate maximum effort from officials whose supposed duty it is to patriotically serve their country. Louis DeAlessi suggests that a ceiling (either statutory or informal) on pecuniary rewards effectively lowers the opportunity cost of nonpecuniary sources of utility to the managers of political firms.\(^3\)

If managers of the same general quality extract the same total compensation from either private or political firms, then leaders in the latter enterprise must be relatively more interested in nonpecuniary rewards. Goals such as personal prestige, status, or power should then take on greater significance in the preference functions of the leaders of public enterprises. These rewards are

available both from within the firm and from associations into which the firm can be led by the political manager.

Managers of political firms are also presumed to have more freedom to pursue this type of welfare at the expense of their employers than are managers of private firms.\(^4\) The basic reasoning is that it is more difficult to concentrate the ownership of public firms behind the detection and policing of managerial behavior. The owner of a political firm must change the political jurisdiction in which he works and resides, organize his neighbors behind a unified effort, or engage in other high cost activity to do what the owner of a private firm can do by simply purchasing stock. Certain situations increase this discretionary latitude. For instance top officials in authoritarian countries tend to be less encumbered with legislative guidelines and oversight than their counterparts in more democratic nations. "Charismatic" leaders seem to play a dominant role in the policy-making process in some third-world states, where "bureaucratically complex organizations" do not exist and are thus unable to mold decisions made by the individual leader.\(^5\)

The tendency for the political manager to place relatively greater value on nonpecuniary goals and to have greater freedom


to pursue them does not mean that the interests of citizen-owners will necessarily be slighted. "Statesmanship" rewards, which the political manager derives from the exercise of his discretionary power to do what he perceives to be in the general interest of the citizens, may provide more utility than efforts to enhance personal income and perquisites. The political manager may thus derive benefit from a special kind of altruism. This type of motivation is often assumed in analyses of relations between state entities.

The traditional approach to the study of international relations has been to construe the nation-state as a unitary actor. Rather than emphasize "statesmanship" motives, political scientists have pointed to the constraints on individuals who would attempt to employ national resources in unpopular ways for a justification of this concept of state behavior. An example is provided in a book by Robert Gilpin. The political managers define the national interest in pursuit of which their agency is operated. The latitude to do this defining in terms of their own interests, however, is to varying degrees constrained by larger influences. These influences center around

6 Roland McKeen, "Property Rights Within Government and Devices to Increase Government Efficiency," Southern Economic Journal, Vol. XXXIX, No. 2 (October, 1972), pp. 177-86 suggests that the employment selection processes found in government tend to weed out people least likely to exhibit a taste for this kind of reward.

7 For a discussion and critique of the use of the state-centric abstraction or "realist" model see Robert O. Keohane and Joseph S. Nye, "Transgovernmental Relations and International
cultural values and considerations relevant to the security of the state itself — geographical position, the evolution of military technology, and the international distributions of power — [which] are of greater importance. 

An example of such a conflict between economic interests and national interests cited for the U. S. is the prohibiting of American subsidiaries from bidding on certain lucrative sales contracts with the Soviet Union, Cuba, or China. In the case of less developed countries (LDC's) the failure of the ruling elite to take these kinds of constraints into account and the ensuing change of ruling elites is the more evident manifestation of their effect. The overthrow of King Idis in Libya in 1970, in part for his not being sufficiently anti-Israeli and sufficiently demanding with international oil companies, is an example of this. Therefore, though individuals make the decisions about the utilization of nationally owned resources for their own benefit, they are expected to be restrained by the views and costs of others overthrowing them. Also noteworthy is the fact that nonpecuniary values can be important to the owners as well as to the managers of political firms. Statesmen, acting


9 Ibid., p. 144.
as the public desires, may pursue nonpecuniary rewards in the way they operate the national firm, therefore.

For our purposes it is not necessary to judge whether the constraints on non-statesmanship behavior by political managers are effective. Important nonpecuniary rewards derived by both interests from the state enterprise are likely to be harmonious when the firm is engaged in international business. Power or prestige or status gained for the country by its national economic venture are rewarding both to the citizenry and to the leaders who operate the firm. Before proceeding with an analysis of the effect of these parallel noneconomic goals on firm behavior it is important to clarity how they may appear in the relevant utility function.

Normally various items in the utility function are viewed as substitutes where one good is traded against another. This strict substitutability need not necessarily hold in a management function where goals other than profit maximization occur. These other objectives may only alter the decision about which definition of profits to maximize. Professor Machlup reckons that many models based on alternatives to profit maximization would yield solutions equivalent to those of the marginalist model if the definition of profits were suitably altered. ¹⁰ This approach is adopted here.

Rather than attempt to directly introduce prestige into the theory,

we will concentrate instead upon how this motive affects the profit choice of the firm. The public enterprise is assumed to seek to maximize the profit that maximizes the power or prestige enjoyed in the gaining thereof.

1. Prestige Maximization

Consider a nation-state that aspires to enhance its international status or prestige through the operation of its national enterprise. Such nonpecuniary profit might be gauged in either of two ways. In one view prestige could be directly related to what the state has the "power to do." The rationale would be that the less dependent the government is on foreign powers for economic and political resources, the greater is its prestige. The size of the government budget or the size of the national army might be convenient proxies. With this outlook, the national firm would be operated so as to maximize its current profits or cash flow.

An alternative perception of status might be termed the "prestige of having." The noneconomic reward comes not from size but from possessing something that makes "others" pay attention to it. For instance, the number of importance of foreign visitors and the amount of world attention focused on the country are the essence of its prestige. If the relevant "others" are suppliants (needy nations seeking aid for some cause), then prestige motivations will again lead to cash flow maximization. The wealth of the country is the object of foreigners' attention.
On the other hand, if the relevant "others" are buyers, then efforts to maintain market share and customer loyalty are more important. Where market entry or displacement of the product of the national firm is possible but controllable by the firm's behavior, the maximization of cash flow would not be consistent with prestige maximization. Long term profit maximization would yield more noneconomic benefit than short term cash flow under this perception.

The importance of this reward structure involving a combination of economic profits and political or prestige "profits" is that the set of values with which the collusion can work to achieve a compromise between firms with divergent interests is expanded. Before this insight can be applied to OPEC one conceptual problem must be broached.

Where the individual manager neither is effectively constrained by constituent pressure nor acts on statesmanship motives, he may tend to be more interested in short, rather than long, term goals. The stream of benefits received by the manager of a political firm tends to be related only faintly to the future well-being of the firm. This circumstance derives from two conditions. One, the longevity of the political manager is limited either to the lifetime of the coalition backing him or to his physical lifetime. Two, the transferability of political power is very restricted relative to economic power. There is nothing equivalent to money which permits the exact valuation, accumulation, and complete exchange of its
benefits. In other words there is no futures market for political capital. Hence, political managers are unable to fully capture the future gains from right decisions taken on behalf of their employers, while they can be made to bear the consequences of currently unpopular or bad decisions. Accordingly, they attach a lower discounted value to future rewards than would their employers. Specifically, any market share losses and the attendant prestige losses caused by current pricing may be a problem only for the leader ten, fifteen, or twenty years from now.

An exception to this short run bias may be found in the situation under consideration. Where power is passed by blood lines, the longevity of individual leaders tends to increase and the welfare of the successor may be important to today's leader. If political power and its prestige rewards (like money) can be inherited, then future rewards may be as valuable to the political manager as to his employers or to an equivalent private manager. Consequently, even where political managers have wide discretionary power in the operation of a public business, they may not concentrate only on short term goals. The ability of prestige rewards to enhance the value of long term profit in a public enterprise then may not be ineffectual.

11 See James Coleman, "Political Money," American Political Science Review, Vol. LXIV, No. 4 (December, 1970), pp. 1074-1087, for an interesting discussion of the similarities and differences between money or economic power and political power.
2. Implications for OPEC

To infer how these prestige motives might influence the oil producers, one or the other of the status perceptions must be attributed to the government of the particular country. Arab states have a common bond in their opposition to Israel. As such the most important "others" in the prestige evaluation of Arab oil producers may be the Arab nations directly involved with the struggle. Political prestige and pressure would then be in support of maximizing current revenue so the friendly defense efforts can be funded. A short term bias of a selfish and independent political manager would reinforce emphasis on this objective. Not only should he suffer little, if any, from future market losses, but also his current prestige is enhanced by his conspicuous involvement in the righteous cause.

The non-Arab producers are not as involved in that cause. The most important "others" in their prestige evaluation may thus be the importers of petroleum. The development intentions and feasibility in most of these nations could enhance the value they place on being important in the community of economically advanced nations. Protection of their accustomed share in the energy market would therefore tend to have some prestige worth to these oil producers. Most of these countries do have extravagant national spending plans and Venezuela apparently feels some foreign aid responsibility toward the rest of Latin America, so current earnings are important. Nevertheless, non-Arab members may have some
noneconomic incentive to guard future markets so as to preserve stature in the developed world. For this motive to be significant in the operation of these national firms, leaders must be assumed not to ignore or be allowed to ignore the value of rewards received in the future.

Making that assumption, this interpretation of political motivations suggest that they serve to offset an economically based conflict among OPEC members over the choice of the uniform price level or price path. The split between Arabs and non-Arabs roughly matches the split between savers and spenders that was developed in Chapter Three. Accordingly, politics may induce Arab/saver producers to place a greater value on current profits than would economic rationality alone. Therefore, prices closer to an entry encouraging monopoly price would be less objectionable to these high reserve, low discount rate producers. Conversely, non-Arab/spender producers may be receptive on prestige grounds to the idea of limit pricing. Unless the non-Arab producers are controlled by near-sighted leaders, the presence of nonpecuniary rewards in preference functions of decision makers seems to provide the oil PEC with a valuable extra dimension for compromising the divergent interests about the choice of a common price level.

Only the potential offsetting quality in bargaining preferences is asserted here, since the quantification of these countervailing influences on member goals is not attempted. The level of a common oil price chosen by the group should not be
modified if the strength of prestige motives are roughly equal in the various members. Only the affinity by economically different producers for the collective price choice is increased. Despite the circumstances described above, if political managers with short term bias do dominate all member decisions, the pattern of non-economic interests might not be allowed to offset national economic differences. Personal prestige rewards would then increase the chances that members would agree to a price like \( P_m \) that maximizes immediate income at the expense of future income and stability. Generally, prestige concerns seem to solidify a compromise price choice or to tilt the preferences of all members toward a short run profit maximizing price for the group.

3. Nonpecuniary Rewards from Collusion

Additional implications about the effect of nationalization on OPEC operations can be found by shifting attention from the role of politics within member firms to its role in relations between them. The existence of interfirm collusion provides several non-pecuniary benefits to political managers and thus increases their willingness to reach compromises which allow for continued joint action. Long term consequences of this willingness may hamper extended collaboration in the PEC, however.

a. **Noneconomic Benefits in the PEC**

One benefit for the officials of colluding nations has already been mentioned in connection with the earlier discussion
of the nationalization process. The joint front of the cartel facilitates the takeover of property previously belonging to multinational companies by the local government. This expectation is based on the fact that buyers have fewer alternatives to which to shift patronage and thereby penalize the expropriating country when several nations simultaneously engage in takeovers. Foreign buyers have little choice but to deal with a national company. Once completed nationalizations have become prevalent, this benefit from belonging to the intergovernmental cartel should fade.

A more lasting benefit to political managers, particularly if they represent LDC's, can be provided by the PEC. By raising price and improving the terms of trade for the commodity exporter, the collective monopoly offers a method of achieving the capital accumulation (considered essential for development) that avoids some disadvantages inherent in other methods. Savings do not have to be generated through high levels of internal deprivation. Foreign investment (particularly in the form of a near autonomous multinational corporation) that looks much like neo-colonial exploitation does not have to be courted. Finally, foreign aid with its debasing and dependency producing properties does not have to be relied upon. Instead, the development funds come out of the monopoly profits earned

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12 Supra, p. 108.

from the sale of a commodity to largely foreign buyers. The PEC provides the benefit of a less painful and a more dignified way for the country to raise development funds.

This source of funds should be particularly attractive to government officials. Not only are they spared the political cost of extracting the funds from the domestic populace or foreign interventionists, but also they have more personal and direct control over the development process. Unlike the situation with a private export cartel, all the benefits from the improved terms of trade are funneled through government spending, rather than shared with domestic producers and consumers.\(^{14}\)

Waters also does a thorough job of explaining various non-pecuniary rewards that enhance the popularity of international organizations in influential circles. For instance, the staffing of the international agency and the domestic supervisory and information roles that accompany the cartel gives senior bureaucrats the right to select employees, allocate jobs, and hold sway over even larger staffs. He further mentions that, for national prestige reasons, officials in international organizations enjoy traveling and office conditions that are superior to those of their domestic peers.

\(^{14}\) Alan R. Waters suggests that more than a few senior politicians in developed and less developed countries feel that economic decisions are more efficient if arrived at through political bargaining than if made by market forces. "The Economic Reason for International Commodity Agreements," *Kyklos*, Vol. XXVII, Fasc. 4 (1974), p. 780.
Keohane and Nye introduce a concept which suggests that administering officials may have an interest in cooperative behavior for less tangible reasons. The same officials, who represent different governments and who meet recurrently concerning certain specific matters, often develop what is described as a sense of "collegiality." This personal attachment can be reinforced by their membership in a common profession like economics, engineering, or the military. Collaboration tendencies are increased in such situations by the necessity of reporting on and defending home country actions periodically in these semipublic forums. The coordination inducement is described in the following quotation.

> It was costly not just in terms of time and effort, but perhaps more important, in terms of the embarrassment of having many members of the club — professional colleagues — charge that another member was not living up to some of its international commitments.

In sum, this argument is that a common reward structure, that benefits both top leaders and administrative officials from various member countries and that is associated with the existence of the PEC, would seem to encourage greater efforts at cooperation on the part of individuals. In particular, one would expect that management latitude and personal rewards would increase efforts by


operatives to find ways to compromise conflicts, such as the choice between a monopoly price and a limit price, which endanger the continued existence of the OPEC organization.

b. Latent Difficulty

The "collegiality" relation among senior and staff officials can, however lead to long run problems for the PEC. Keohane and Nye point out that where the same individuals conduct the intergovernmental negotiations, "transgovernmental elite networks" come to be formed. These institutions, by linking officials in various governments to one another by ties of common interests, professional orientation, and personal friendship, ... may permit the development of flexible bargaining behavior in which concessions need not be requited issue by issue or during each period ...

[The results are] the development of "political bank accounts," where mental reckoning of political credits and debts relaxes the need for all payoffs to be immediate. 17

The inference is that collective action may be very successful for a time because of this "flexible bargaining behavior."

Turnover does occur in the ranks of the negotiating officials. When one or two key officials leave the policy-making or administering elite networks, especially if they leave "deficits" in their "political bank accounts," "surplus" officials can suffer losses which make further cooperation less likely. Successors might not assume these political debts. Even if they do, they are unlikely to place a value on these obligations as high as did their predecessors.

17 Ibid., p. 46.
James Coleman points out that the inability to set a quantifiable value on political capital greatly hinders its accumulation and exchange. 18

Private cartels can, of course, develop similar negotiating networks. One would suppose though, that the officials of these latter enterprises, being concerned more narrowly with pecuniary income, would be more inclined to secure agreements with tangible "quid pro quo" pledges, whose ownership or obligation can be passed on to successive managers. Basically, this counter-argument is that the political capital in these "bank accounts" is less certain transferred; that intergovernmental relations are more likely to rely on such "capital" to continue cooperation than are relations among private businesses; and that these "political bank accounts" may thus enhance short run unity only at the cost of greater long run disunity. To the extent that the success of a particular PEC is based on the mutual understanding of the officials of member nations, its special strength may be limited to the tenure of its initial leaders. Further, vestiges of its early strength -- resentment for repudiated or undervalued "debts" -- may act to hasten the break up of the PEC after some key individuals leave.

This point may appear rather tenuous. However, it does serve to temper the impression that personal utility and personal ties among leaders in intergovernmental commodity coalitions always work to

support group solidarity. If a PEC imposes some penalties on individual actors, they can be expected to consciously work for its demise.

The impression fostered in the papers by Waters and Keohane and Nye is that the participating officials steadfastly work to preserve and promote cooperation in the international organizations to which their governments belong. Both papers explicitly disregard penalties which might create disunifying incentives for individuals, since each seeks to explain only some personal factors which enhance international cooperation. For instance, things like personal animosity, jealousy, or xenophobic feelings, may lead these officials to sabotage some efforts at international cooperation. Individual philosophical differences can make effective communication more difficult and personal contact less pleasant, and thus indirectly undermine recurrent negotiations. PEC officials with truly statesmanship motivations may also work against a cartel price that can damage the future welfare of their own country. The presence of these factors can be uncovered only by detailed, case-by-case analyses. In this more generalized survey it is enough to acknowledge that, given the unusual freedom of operation that political managers may enjoy, any personal disutility inflicted by the PEC associations will tend to weaken attempts to overcome friction concerning price preferences and thus can endanger the performance of the PEC.
B. Sovereign Oligopolists

In this section attention is shifted from nonpecuniary incentives of members to the ability of the group to insure that collusive intentions are carried out. The political autonomy of the firms participating in the PEC means that they face no legal threat to their monopolization attempt. The cartel must contend only with market forces in its endeavor to organize the seller side. This same member sovereignty also creates several conditions which can impair the coordination of member activity and the detection and deterrence of price cheating.

1. Limits to Economic Integration

By their collective nature and monopoly restriction, all cartels inherently admit the possibility of price chiseling. The surest way for groups to avoid this debilitating behavior is for the members to permit the establishment of a strong central agency with the power to assign, inspect, and enforce quotas for each member. Completely fixed portions of the market available to the group serve to eliminate the incentive for price chiseling. Each member faces a demand curve with the same elasticity as that of the cartel demand curve at the established price. Therefore, under this scheme no extra profit can be made by price cutting. 19

19 A member restricted to a 10 per cent share of the market would be restricted to 10 per cent of the change in market quantity. Thus, the numerator of the elasticity fraction is the same size for the firm as for the whole industry. This is another way to state the effectiveness at deterring cheating of the quota rule developed
a. **Aversion to Direct Transfers**

Sovereignty considerations seem likely to prevent a PEC from adopting allocation formulas. For instance, quotas may be assigned so as to minimize the cost of providing the total output on which the cartel settles. High cost producers would then be assigned small or even zero current output. In a cartel selling a nonreproducible commodity, producers with relatively larger reserves tend to have lower costs than do small reserve producers. Where user costs dominate full cost functions, high reserve firms would be the low cost or large quota producers in the cartel using a cost minimization quota rule.

To gain the acceptance of the low reserve/high cost producers, some transfer of funds from large quota producers probably would be required. The onus for profit reallocation is especially intense where the high cost firms place great value on current revenue, for instance, because they are high absorber economies.

However, government participations are not likely to voluntarily submit to schemes that have them become dependent on other nations for essential transfers. When the government producer has the output capacity to avoid such dependence, that kind of scheme would seem particularly unlikely. Too much leverage over

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20 As demonstrated in Chapter Three, p. 43, the full cost of a non-reproducible commodity consists of a production cost component (current lifting cost) and an opportunity cost component (profit receivable at date of exhaustion discounted back to the present).
the operation of the government and the welfare of the nation that is heavily dependent on earnings from that one commodity would be given to foreign rivals. National governments are institutions accustomed to exercising sovereignty over domestic matters. This hypothesis is close to the earlier explanation of why host countries tend to force multinational corporations to relinquish local concessions as soon as feasible. OPEC nations that have just obtained control over oil revenue from one international entity are not likely to turn around and share it with another.

The implication for the oil PEC is that low reserve members will not accept quotas which reduce their output levels significantly without compensation. However, their sovereignty concern will also not allow them to become dependent on direct financial transfers from low cost members. Another type of quota which may be excluded by political sovereignty concerns is best developed by direct reference to OPEC.

b. Significance of Relative Shares

An analysis of absorptive capacity by C. A. Gebelein indicates that Saudi Arabia alone has the capability to accept substantial reductions in the world oil demand without compromising practicable spending programs. He estimates that even by 1980,

21Supra, p. 106.

Saudi Arabia would need to produce only 3.2 MBD (compared with a 1976 production rate in excess of 8.5 MBD) at current prices to cover all of its import demands. In other words, Saudi Arabia individually could absorb a 17.5 per cent reduction in the demand for OPEC exports without curtailing spending on social projects. During the 1975 recession, demand for OPEC oil was down only 12 per cent from 1974 levels. In his calculations it also appears that a group of other low absorber nations in that area have similar capability. Kuwait, the U. A. E., Qatar, and Libya could together absorb a 12.5 per cent reduction in total OPEC output without necessitating any belt tightening.23

These figures are derived from an estimate of maximum government spending on administration, infrastructure, and defense that is feasible with a fully employed indigenous and expatriate labor force. Subsequent reports indicate that spending by Saudi Arabia, and probably the other OPEC countries identified above as the low absorbers, are not constrained by as much as these estimates their article "Prospects for International Oil Supply and Demand: 1975, 1980, 1985," as does Raymond Vernon in "The Oil Crisis: In Perspective; An Interpretation," Daedalus, Vol. CIV, No. 4 (Fall, 1975), p. 9.

Gebelein does indicate that there can be technical and engineering factors, such as long term damage to oil reservoirs, which may limit the amount of downward adjustment of field production. Ibid., p. 54.
suggest. Nevertheless, these saver countries have the ability to reduce oil production with much less hardship than do their high absorber partners.

The OPEC group could employ this facility to ease financial pressures on member governments in countries where internal spending needs are most pressing. As demand grows, low absorber producers might be asked to permit high absorber members to supply as much of the extra consumption as the latter have or can install the capacity to handle. If demand slumps, low absorber nations would be asked to accept most or all of the output cutback. In effect this quota scheme would involve a transfer of customers or sales, rather than of excess oil revenue, among the members of the cartel.

Under such an arrangement, the high absorber producers might be persuaded to accept somewhat lower prices than they would have insisted upon at the old market shares. Because their sales volume expands relative to the market, the somewhat lower price would not hurt their revenues. This scheme would defer a larger portion of the output of the high reserve countries than would the situation where the overcapacity burden is more equally shared. But, it would also tend to lessen pressure on importers to find

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24 Spending rates in Saudi Arabia as reported by The Wall Street Journal, April 29, 1977, would have required production to average at least 6 MBD in 1975-76 and over 7 MBD in 1976-77. Gebelein notes that his estimates may not coincide with the need perceived by policy makers in OPEC governments. Ibid., p. 67.
energy alternatives to OPEC oil. The market price of oil would
not be quite as high, so the switch from OPEC oil, by say the
year 2000, could be a bit less than it might otherwise be.

A basic tenent repeatedly observed in international
relations would seem to severely limit the ability to use this
form of transfer to stabilize the cartel. The relative share of
good fortune or of burden appears to be crucial to any joint
activity by sovereign states. The zero sum nature of political
calculations and its implications for a PEC is described in the
following two quotations from Robert Gilpin.

The essential fact of politics is that power is always
relative; one state's gain in power is by necessity
another's loss. Thus, even though two states may be
gaining absolutely in wealth, in political terms it
is the effect of these gains on relative power positions
which is of primary importance... Though all may be
gaining or declining in absolute capability, what will
concern states principally are the effects of these
absolute gains or losses on relative power positions. 25

He goes on to attribute this zero sum nature to the psycho-
logical dimension of power (which he calls the basic concept in
political science), which makes it hard to quantify. Perceptions
of power relations then assume critical significance.

Power as such is not the sole or even principal goal
of state behavior. Other goals or values constitute
the objectives pursued by nation-states: welfare,
security, prestige. But power in its several forms

(military, economic, psychological) is ultimately the necessary means to achieve these goals. For this reason, nation-states are intensely jealous of and sensitive to their relative power position. The distribution is important because it profoundly affects the ability of states to achieve what they perceive to be their interests.26

The measure upon which this relative position is judged may be hard to isolate. In a PEC selling a reproducible commodity, an agricultural crop or a manufactured good, this determination is most easily made by reference to market shares of output or of its counterpart, excess capacity. With a uniform cartel price, these shares determine relative revenue or wealth/power positions for the member national enterprises. Fluctuations in these shares, whether caused by natural shifts in market demand, by price chiseling, or as a consequence of reliance on one or a few member firms to assume most of the output restriction necessitated by the high cartel price, would then be expected to strain the solidarity in a PEC.

In a PEC that sells a nonreproducible commodity, a naturally occurring resource that exists only in limited supply, current market shares may be of less significance. Today's smaller share of sales means tomorrow's larger share of the existing reserves. Given the size of proven and probable world oil reserves and the anticipated feasibility of substitutes noted in the previous chapter,

26Ibid., p. 23.
dominance of the future energy market by high reserve countries in OPEC is not assured. As a consequence of this doubt, current market shares or excess capacity proportions tend to be the safest and simplest measure of relative well-being among countries endowed with large oil deposits.

The implication of this reasoning is that the more modest economic need or spending capacity attributed to certain OPEC producers will not determine how much output reduction the cartel can tolerate. Just as high absorber members can be expected to oppose quota and transfer schemes that make them dependent on gifts or loans from other oil exporters, low absorber members will probably oppose accepting too large a share of the current excess capacity. A national concern for relative status, rather than an economic evaluation of the need for current revenues, may force each country to insist that its own firm share equally in output growth and that firms in other countries share in output declines.

A variant of the model presented in Chapter Three can be used to illustrate the basic point being made. In Figure 5-1, let MC represent the marginal cost for a cartel consisting of a low absorber producer (LA) and a high absorber producer (HA). Let D₀ represent the stable demand curve (as in Figure 3-2, page 58) confronting this cartel in the absence of entry by alternative sources into the energy market. Let De represent the demand curve left to the cartel, in say 1985, following a given amount of displacement by substitutes. If price is initially set at P₁,
FIGURE 5-1

RESIDUAL SUPPLIER RESPONSIBILITY
entry will not occur, so $D_e$ and $D_g$ coincide at and below that price. The further above $P_1$ price is at first set, the more entry by non-cartel sources should occur. Thus, $D_e$ should be more elastic above $P_1$ than $D_g$.

Suppose the group decides to operate at $P_m$ and assigns producer LA the role of residual supplier, fulfilling demand only after HA has sold all it is capable of providing. In terms of Figure 5-1, HA would provide its capacity output, $O_h$, per period and receive revenue of $P_m O_h$, and LA would provide whatever else the market will absorb at $P_m$ (hm with a revenue of $a_f m h$ before entry). Assume that while member production capacity remains as described by MC, entry reduces the sales of the group to $O_k$ at the price $P_m$. Under the residual supplier agreement at the fixed price, sales for HA would be unchanged. For LA, however, sales would fall to $h_k$ and revenue to $a_k h$. Total income drops below expected income only for the residual supplier.

Even if member production capacity does decline, the same deterioration in the relative share left to LA occurs if the displacement amount ($k_m$) exceeds the fall in the production capacity of HA. Likewise, if the market expands ($D_g$ shifts to the right), the rotation to $D_e$ could still shrink the output and profit share left to LA. The combination of any increase in production capacity in HA (increase in $O_h$) and and entry alteration of cartel output ($k_m$) would have to exceed the size of the expansion of the quantity demanded from the cartel at $P_m$ ($O_m$).
A belated realization that an initial price of $P_1$ would not have resulted in this asymmetrical sacrifice can intensify the reaction by LA against the cartel. At $P_1$, HA revenue of $P_1bh0$ would not have grown relatively to LA revenue of belh. Political regard for relative output or revenue share can render just the prospect of share deterioration unpalatable to the low absorber producer. The entry contingency may force each member government to insist that its own firm share equally in output growth and that firms in other countries share in output declines.

Data cited in Table 3-2, pages 76-77 indicate that while aggregate OPEC output increased just under 12 per cent in 1976, output from low absorbers Saudi Arabia, the U. A. E., and Libya increased by between 16 and 30 per cent over 1975 levels. Other factors, such as greater recovery by their particular international company customers, may be more directly responsible for these performances. However, the larger output expansion by those producers that bore a disproportionate share of the excess capacity in 1975, probably helped ease political tension among the nation-state members.

The exclusion for political considerations of this quota scheme employing residual producer(s) is the most important consequence of our emphasis on member sovereignty, rather than the dominant firm, as characterizing behavior in the oil cartel. If the Saudis are largely unchallenged as price leaders in OPEC deliberations and if they act accordingly, their concern for
relative shares within the cartel would be limited. They may act from economic and anti-Israeli interests confident in the belief that the rest of OPEC will follow their lead. Casual observations such as the data cited in the previous paragraph and the pricing division in the cartel during the first half of 1977 argue against this mature price leadership approach, however.

Professor Adelman suggests that OPEC uses a subtle form of side payments at the present time to induce high absorbers to share the overcapacity burden.\textsuperscript{27} By agreeing to current price levels and increases that are higher than would appear to maximize the discounted wealth of their oil deposits, high reserve countries are transferring some of their future profits to low reserve countries today. If side payments in the form of uneconomically high price levels and increases for all OPEC oil cease, high absorber willingness to accept some of the excess capacity burden may evaporate.

The arguments to this point support the proposition that national sovereignty considerations will make it difficult for the oil cartel to replace its current output allocation and side payment system with one of the two alternatives suggested above. While relying either on high cost members or on low absorber members to bear most of the burden (with compensating transfers)

of holding output below a secular trend are not the only allocation schemes that can be used in a dynamic market situation, they appear to be the most logical candidates for OPEC consideration.

The importance of this proposition is that OPEC faces more than the normal problem confronting any cartel that attempts limit pricing. The negotiation of individual quotas that provide enough aggregate output to hold market price just below the entry inducing level is made more difficult by the need to avoid altering relative positions and obvious transfers. Sovereignty obstacles to adopting what seem to be the best alternative sharing tactics implies that the oil PEC may be unable to pursue a limit pricing strategy, even if members agree to in principle, because a way to allocate the necessary output and resulting profits cannot be instituted. The practical exclusion of coordinated limit pricing does not mean that the current expediency system for distributing cartel output and profits can not be made to work for a prolonged period.

2. Enforcement Substitutes

A general bias against the delegation of the power to determine output (formal prorationing) to the cartel (i.e., to rival nations) would seem to characterize a cartel of sovereign governments. This kind of collusion is more likely then to rely on methods other than formal quotas as a means for discouraging cheating and insuring that the joint price is being observed. Something akin to the government in a local price fixing arrangement that acts as an unbiased and external policer for the cartel might
thus be rather important to the PEC. The successful control of a chiseling incentive could require this outside assistance to do such things as monitor and report individual prices, discourage output or capacity expansion by members, and/or slow the entry of new sources of supply into the lucrative market. Several of these functions can be performed for the PEC and thus substitute for the absence of a single government with jurisdiction over the several member firms.

a. **Military Force**

A member government with a relatively strong military force can use this tool to enforce discipline and discourage cheating in the group. The free rider problem in the cartel is handled not by a collective decision to relinquish secrecy or discretion over the disruptive activity to a central agency, but by the superior power of one member that acts in the interest of the group. The militarily dominant national member can destroy or occupy and shut-down the productive capacity of rivals that attempt to cheat, just as a national government can impose civil penalties on cheaters in a private cartel that is authorized to operate within a country. The military threat also could be directed at an unrelated activity of the offending nation if that target were more accessible. The mere threat of military action may be sufficient to discourage chiselers. One condition compensating for the absence of a
supporting authority for the cartel would then appear to be the existence of one member with unquestioned military superiority. 28

Because one member rather than a consensus of members performs the enforcement function, that power may be used to benefit only the interests of the individual producer. For this capability to replace a neutral enforcement authority it is necessary to further specify that it be in the perceived interest of the militarily dominant member to use its power to support the cartel agreement. A circumstance which can produce this result is economic sophistication on the part of the leaders of the militarily dominant member. Where they understand and appreciate (1) that chiseling by one produces losses in the pecuniary profits received by other individual collaborators and (2) that defensive responses will result in negative sum outcomes for all members, they should decide neither to consider cheating themselves nor countenance it by others. 29 A supportive circumstance would be where the dominant military member is also the largest producer. Pursuit of that rank will then not provide a justification for cheating by the enforcer that can be defended by armed might.

28 If two different members are strong militarily relative to the other members, they may engage in mutual rivalry and thus divide the resolve to use force against a cheater.

29 An exception would occur when the militarily dominant member preferred a lower price than the one set by the PEC. Cheating which moves the cartel price in this direction would not be opposed by the militarily dominant member.
Assuming that the military capability is expected to be used to support the cartel, it is possible to identify some conditions under which it will be most effective. Geographical concentration of producing nations will make it easier to carry out military missions against cheaters. Also, the less dependent the militarily dominant member is on arms resupply sources under the control of organized customer interests, the more likely it is to expend weapons in support of a high price. Buyer pressure against such actions and exercised through the threat to withhold replacement arms is less important. By facilitating the use of martial tactics, these conditions enhance the deterrence to cheating provided by the possession of superior military power by a single member satisfied with the cartel price.

b. Importer Assistance

Countries that import the product of the PEC may aid the cartel inadvertently or on purpose by performing some enforcement or detection functions for the group. Governments in consumer countries occasionally impose quotas or tariffs on the imports from some countries or from all countries for reasons unrelated to the economics. Importer governments are political institutions that respond to more complex incentives than the pecuniary well-being of consumer groups. For instance, importers may assign quotas to the exports of certain countries for security reasons,
for social justice considerations, or to pressure the exporter to remedy some other grievance between the nations. Though the intent may not be there, the effect is to help enforce prorationing where the PEC may not be able to otherwise.

In a related situation the importer government may over respond to consumer political pressure for lower prices. Since this government cannot control the price charged by foreign suppliers, it may control the price charged by domestic producers in order to lower the average price of the good to its consumer constituency. The result is a reversal of the infant industry argument for protecting and assisting in the development of local producers. Instead of helping an immature domestic industry, the importer government is protecting vocal, domestic consumers. The international cartel is helped by the penalization of new producers whose entry or expansion might compete away some of its business.

Even where such partisan efforts are avoided, importer governments may still provide some valuable service to the PEC. "[T]he fondness of the bureaucracy of all developed nations for publishing output statistics" generates information which assists cartel members in checking on each other's loyalty to the agreement. This service may be particularly useful where the members are

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30 A case in point is the U. S. government embargo on direct purchase of Rhodesian chrome by American firms.

31 Osborne, op. cit., p. 842.
sovereign states that can distort or keep secret their sales records. Data from the buyer side may be all that is available. At the least, it provides statistics against which to compare those provided by (potentially cheating) collaborators. In either case the ability of the cartel to detect cheating is enhanced.

Authorities in LDC's may even succeed in enlisting the conscious aid of governments in importing nations in enforcing the monopoly price. This would legitimize the export cartel by making it an international commodity agreement (ICA). 32

The richer importing countries may consent to and join ICA's for a combination of reasons. 33 That vehicle provides legislators with a politically less costly method than aid appropriations for transferring development resources to LDC's. Also, commodity cartels promise on an international level the same sort of humanitarian benefits that agricultural support programs do within the U. S. In these commodity market's where demand and supply are often highly inelastic, drastic price changes are thought to constitute a clumsy and costly means of effecting economic adjustments. This disguised form of aid is far from ideal, however. A few of its drawbacks include the facts that aid distribution becomes a function of commodity distribution, non-LDC producers are benefited, the


33 Waters, op. cit., pp. 748-86.
subsidization can lock the LDC into production of that one commodity, and the donor has no influence over the use to which the funds are put.

Ultimate consumers in import countries may also accept the higher prices with little resistance. The commodity in question often represents a minor portion of their budget and may be included in small amounts in a large variety of items they directly consume. The cost of information to the individual consumer about the relative importance of the cartel is often too high to permit pinpointing this reason, above others, as being behind a widespread price rise.

Even there the cause is obvious, the cartel or ICA may not be vigorously opposed. It is argued that stable commodity price, whether done with ICA buffer stocks or with export cartel restrictions, may assist industrial countries in controlling their own inflation.\(^\text{34}\) Sharp price increases for mineral and agricultural products lead to increases in prices and in wage demands by labor faced with higher living costs in developed countries. When commodity prices subsequently fall sharply, companies and unions don't often accept price and wage reductions. Commodity price surges thus may help ratchet up inflation rates.

\(^{34}\) Nicholas Kaldor, "Cartelization: The Economic Impact of the New Restraints," *Business Week*, May 9, 1977, p. 82.
c. Implications for OPEC

Since crude oil prices were stable at the pre-1970 level the possible offsetting benefit to industrial countries of reducing price swings does not apply to OPEC. Nevertheless, the oil cartel may benefit from the suspicion that export monopoly combinations among LDC's might have some redeeming features. To the extent that U. S. price controls slow the development of more U. S. oil and gas production and that the proficiency of statistical gathering agencies in the developed world discourages attempts to secretly cheat, OPEC benefits from inadvertent importer assistance. U. S. officials have been accused of encouraging the OPEC monopoly as a way to improve the competitive position of American exporters that consume petroleum. The export advantage thesis is that American firms use less imported fuel than do European and Japanese firms and thus pay less for energy inputs as world prices rise above the controlled prices of U. S. oil and gas.

The oil PEC seems less likely to be assisted by the threat of military action against cheaters, even though military capability has increased greatly in OPEC. Iran has occupied three islands at the narrow mouth of the Persian Gulf, Abu Musa and the two islands of Tumbs, since November, 1971.\(^{35}\) This seizure of territory formerly controlled by the U. A. E. improves Iran's ability to

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blockade oil shipments out of the Persian Gulf and thereby provides it with a more credible threat to discipline cheating by the countries who rely on this route to their customers.

A Saudi Arabian arms build-up would also seem to provide it with the potential to act as a quota enforcer in the Persian Gulf. Professor Adelman has suggested that it has the capability to destroy or occupy and shutdown neighboring production operations that threaten to force too much excess capacity burden upon it.\footnote{U. S. Congress, Senate, Multinationals Subcommittee of the Foreign Relations Committee, \textit{Multinational Hearings}, 94th Congress, 1st session, 1975, part 11, p. 6.} Rapid expansion of production in the U. A. E., for instance, could entice such behavior by its more powerful neighbor. The fact that nationalization is lagging in the smaller states of the U. A. E. might help induce just this kind of expansion in production. The companies will have access to equity crude in these areas for some time yet. If this oil is more profitable than the contract oil they buy from national companies in OPEC, international companies can be expected to push its extraction now.

Given the history of regional squabbles in the Middle East, military measures in support of the cartel are not out of the question. Several considerations, however, argue against their effective use. Neither Saudi Arabia nor Iran has the capability to engage in military action against OPEC members outside of the Persian Gulf. Even within that area this capacity could just
as plausibly be used to protect price chiseling favorable to one of these two regional rivals. The comparable military power of these two nations with different political and economic interests may neutralize the ability of either to forcibly discipline cheating by client states of the other.

3. Absence of Adjudication Procedure

One other problem derived from member sovereignty may plague a PEC. Jacob Viner suggests that the probability of irreconcilable conflicts arising among nation-states in any business relation is greater than in a similar relation among private enterprises. When government management is substituted for private management in an international market, he asserts that any:

... sense of grievance will result much more directly in an issue between governments, and the fact that a government or governments is involved will give the incident a much greater potency in inflaming public opinion in the countries concerned.37

Though he is referring to relations between state controlled (whole) economies (state trading), countries that depend on the cartelized commodity for a large share of foreign exchange earnings would certainly attach roughly equivalent significance to economic relations surrounding that one commodity. Even if the PEC countries do not trade much with each other, they are negotiating and may

commit to a number of agreements. For instance, subgroups in OPEC are discussing joint production, marketing, or transportation efforts, and the whole group is attempting to negotiate suitable price differentials for their various crude oils and may even try production control schemes, any of which provide an arena in which "grievances" can arise.

Viner suggests that governmental operation of economic enterprises is dangerous to the continued cooperative relations between colluding parties for two reasons.

First,

the boiling point of patriotic public opinion is lower where governments are immediately involved in controversies than where either they are not formally involved at all or are involved only because of their intercession on behalf of individual nationals.

The difference is due to the reward structure. Private enterprises are normally nonpatriotic, in that their own resources are not deliberately used at financial cost to private owners to serve national ends of power, prestige, or prosperity. As such, they should have much less ability to mobilize "patriotic public opinion" behind their grievance, the advantageous settlement of which will benefit relatively few, than should a national enterprise whose "winnings" promise to be shared to some degree with all citizens.

Second, intergovernmental relations have to a much smaller degree than private relations "a logical, administrable, and generally acceptable code" whereby disputes on commercial matters
can obtain adjudication. The disinclination of nations to relinquish sovereign authority over operations carried out by their own government to an organization like a PEC was developed earlier. Dispute settlement thus falls to ad hoc diplomacy, where the possibility of resort to force in case of an unsatisfactory outcome biases diplomatic negotiations in favor of the more powerful countries. The replacement of impartial adjudication by biased negotiation of economic disputes works against the attainment of a stable monopoly equilibrium. Due to the forced reliance on political or diplomatic procedures, conflicts which arise during normal economic intercourse are less likely to be effectively resolved. The establishment of a more acceptable grievance procedure might be the most important long run benefit that exporters derive from bringing important buyers into their commodity agreements.

C. **External Issues**

Issues outside the commodity cartel can enter explicitly or implicitly into negotiations and decisions about the activities of the coalition. These concerns exist apart from the cartel and affect it only because they are important to the same group of nations.

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38 Zuhayr Mikdashi points out that OPEC has been plagued by just such unwillingness in its attempt to implement conference resolutions aimed at setting up a high court of justice to arbitrate in oil and related affairs among members and to adopt a code of uniform petroleum laws. "The Oil Crisis: In Perspective; The OPEC Process," *Daedalus*, Vol. CIV, No. 4 (Fall, 1975), p. 213.
External issues can strengthen the economic bond among members in two ways.

1. Community Interest

The general impression seems to be that a monopoly coalition will be benefited by the coexistence of some political integration among the various members. The thesis is that a prospective chiseler must balance two kinds of costs against only one kind of benefit from chiseling. The increased revenues from successful chiseling must be weighed against the possible political costs to the cheater from ill will and sanctions by neighboring members if he is exposed, as well as the economic costs associated with the loss of monopoly position if a collapse of the cartel is caused. Presumably this concentration of political influence on the side of costs from a breakup is based on the assumption that the members are natural allies for reasons other than the export of a common good. For instance, if they are compatible in language, race, locale, form of government, stage of development, national outlook, etc., they may enjoy and prefer continued friendly ties with each other even in the absence of this particular economic similarity.

Mikdashi points out that because of the diversity of their political philosophies, the history of boundary disputes even among the Arab countries, and their dissimilar development

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capabilities, the OPEC countries do not constitute a political community as does, say, Western Europe. Disharmony due to these differences offsets political solidarity that might be derived from the common Arabism of several members. Thus, though this "community interest" could add to the stabilizing tendencies of common economic gain in some PEC's, it probably does not in the case of OPEC.

2. Common Foes

Another supposition related to the PEC character of a cartel is that nations, when confronted with outside opposition aimed explicitly at undermining their coalition, may be induced to give greater weight to political considerations of unity than to economic incentives for price reductions that increase revenues. The presence of an overt threat perceived by all members can make each more willing to sacrifice for the common good. Israel may provide the focal point of a common foe for the Arab members of OPEC. If the interest in this common target fades or requires too much economic sacrifice by the non-Arab members of OPEC, this strengthening factor should dissipate. Another common target for the OPEC nations is the small group of preeminent multinational oil companies with which they nearly all deal. These seven or eight companies

40 "Cooperation ...," op. cit., p. 17.
41 Willett, op. cit., p. 243. This expectation is possibly based on a fear that the outside threat will be seen more as a deliberate attempt by foreign powers to reimpose economic subjugation than as an attempt to return competitive efficiency to world trade.
are widely viewed as having had and may still have significant
monopsony power in dealing with oil exporter nations. Overt and
concerted opposition by major oil consuming nations could provide
the same kind of focal point for joint opposition by OPEC nations.
Counter embargos of food products, for instance, or import quotas
or tariffs discriminatorily applied to OPEC producers could have
this unwanted result in the cartel. In effect, a common enemy for
the PEC members works as an antidote to their sovereignty orienta­
tion by directing individual attention at another reason to act
jointly.

D. Conclusion

Due to the involved nature of many of the arguments discussed
in this chapter, it is not possible to review concisely all of them.
It is possible to review the overall thrust of the foregoing
reasoning with reference to its application to limit pricing and
stability in OPEC. The behavior of a cartel assumed to be governed
by direct democracy is largely a product of the bargaining interests
and strengths of its members. The outcome expected from a bargaining
process based only on economic self-interest can be altered by three
characteristics resulting from the national enterprise composition
of a PEC, nonpecuniary management goals, member sovereignty, and
the potential influence of external issues.

Nonpecuniary rewards are expected to take on greater signi­
ficance in the decision functions of political managers and owners.
Under certain conditions the range of goals acceptable to cartel
members is expanded by an appreciation of noneconomic gains. The configuration of prestige interests in OPEC would seem to provide a clear assist to attempts to compromise the divergent economic preferences about the choice between a short run and a long run profit maximizing price or price path. Various nonpecuniary benefits generated by a PEC organization can further intensify manager efforts to coordinate current producer activities. However, even where manager interests lead to extra conciliatory efforts now, the economic group may suffer from long term problems connected with the transitory nature of political alliances.

An adherence to individual sovereignty by members will narrow the choice of formal collaboration tools available to the PEC, and thus elevate the importance of informal methods of securing the collusion against cheaters. The governments of oil-importer nations provide some seemingly inadvertent and valuable support for price maintenance efforts by OPEC. Unless this outside assistance is formalized, it should not help the oil PEC suppress the emotional conflicts that are more likely to arise in business associations among national firms than among private firms. As entry pressure intensifies under the encouragement of a price above the cost of feasible substitutes, the missing adjudication procedure could become a crucial weakness. If importers swing toward aggressive opposition to OPEC, there is the danger of inducing the producers to overcome sovereignty obstacles to more stable coordination.
As a general impression, it would seem that noneconomic elements may enhance the ability of the OPEC group to agree in principle on limit pricing yet may prevent the adoption of steps that translate that consensus into practical operation. Expedient responses by importer authorities that have the side effect of hindering the development of alternative energy sources can compensate for this deficiency in the oil PEC. Also, external threats, such as coordinated opposition by oil-importers, can provide the impetus to overcome the natural reluctance of PEC members to adopt measures necessary to operationalize a limit pricing ambition. Does the International Energy Agency provide this impetus to formal coordination or institutionalize the importer assistance to OPEC? Part III addresses these and related questions.
PART III

IEA AND OIL PRICES
CHAPTER SIX
THE IEA PROGRAMS

The International Energy Agency (IEA) is an autonomous body of nineteen major oil consuming, industrialized nations setup within the Organization for Economic Cooperation and Development (OECD). It is intended as a new institution to cope with the problems presented to the major oil-importing nations by the startling success and unity of the OPEC and OAPEC nations.\(^1\) The overriding target of the IEA is to allay fears that individual participants will gain from a relationship imposed by the oil producers and to reduce the dependence of industrial states on OPEC-controlled oil.

A discussion of this importer group is relevant to an analysis of the oil-exporter PEC because the IEA's existence and activities may have a significant impact on OPEC's price selection and survival.\(^2\) Because of the relatively obscurity of the

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\(^1\) OAPEC is the Organization of Arab Petroleum Exporting Countries. It was founded in 1968 and consists of the seven Arab members in OPEC and Egypt, Syria, and Bahrain. This is the group that actually embargoed oil shipments in 1973 and 1974 and is more uniform in its political opposition to Israel.

oil-importer organization, it is useful to devote some space to reviewing its development and scope. The purpose of this chapter is to outline the status of proposed IEA programs and to offer some comments about their chances for adoption and success. The following chapter will return to the main topic of this dissertation by exploring the effect the IEA can have upon the choice and control of the world oil price by OPEC.

A. Insurance Policy Measures

The IEA's chartering document or treaty -- the International Energy Program (IEP) -- contains five basic sections. Three of these are provisions designed to assure the participating countries that the chaotic and potentially disruptive atmosphere brought on by the oil embargo of 1973 will not be repeated. These provisions involve: (1) an automatic oil-sharing scheme for emergencies, including emergency reserve and demand-restraint obligations for each country (Chapters I-IV in the IEP); (2) the development of an extensive information system on the international oil market (Chapter V); and (3) periodic government-oil company consultations (Chapter VI). This section briefly explains the nature of each of these insurance provisions as laid out in the IEP.

The information on these sections, unless otherwise specified, is summarized from Ambassador Etienne Davignon, "The New International Energy Agency," The OECD Observer, January-February, 1975, pp. 20-25; and the text of the Agreement on an International Energy Program (Brussels: September 27, 1974), a copy of which can be found in U. S. Congress, Senate, Committee on Interior and Insular Affairs, Serial No. 93-53, 93rd Congress; 2nd session, 1974.

The standby oil-sharing system is rather detailed and precise in its attempt to achieve emergency self-sufficiency in a way that spreads the sacrifice equally for everybody. Full members, upon joining the IEA, provisionally agreed to the plan outlined here. On January 19, 1976 the U.S. became legally bound to its obligations under the IEP. As of January 1, 1977, three of the seventeen full member states were still only provisionally bound.4

a. Stockpile Requirements

One part of the system initially commits each participating country to the maintenance of emergency oil reserves (either as oil stocks, fuel switching capacity, or standby oil production capacity) sufficient to sustain consumption for 70 days with no net oil imports (to be increased to 90 days by 1980). The Europeans and Japanese are in effect committed to bearing a proportionately greater share of the expensive stockpiling requirement. This distribution of the burden is due to the fact that the U.S. and Canada have relatively larger potential for standby oil output in the form of tertiary production and tar sand oil production.

In embargo situations equivalent to that in 1973, the amount of oil needed to meet the stated requirements should provide much

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longer protection, since all net imports into IEA nations would almost certainly not be stopped. With oil reserves equal to 70 days of net oil imports (as each IEA country is now supposed to maintain as a minimum), it would take 14 months to use up one half of these stockpiles, were oil supplies to be cut by 20 per cent.\(^5\)

Since non-OAPEC countries like Venezuela, Iran, and Nigeria increased oil shipments in 1973–74, the actual shortfall in IEA imports during that six-month crisis was only about 10 per cent.

However, under the IEP definition of oil reserves all the stocks counted would not be available for use to the countries denied oil imports, unless they were willing to risk a crippling disruption of their petroleum distribution system. For instance, the National Petroleum Council (NPC) estimated that 750 million barrels of oil were required at the end of 1974 to fill the U. S. processing and transportation system.\(^6\) This amount could be drained only at the cost of increasing disruption or dislocation in the near future, when it would have to be replenished. The IEP definition of emergency reserves includes a significant share of these operating stocks in all countries. Thus, the effect of a full 70 day embargo on net oil imports would not be circumvented by the treaty obligations.


The U. S. legislation ratifying the IEP — the Energy Policy and Conservation Act of 1975 (Public Law 94-163) — gave the President the standby authority to order increased output from domestic oil fields, and mandates the establishment of a strategic oil reserve. The reserve system in the bill contains two basic provisions. For the short term (to be built with three years) the Federal Energy Administration (FEA) is to acquire not less than 150 million barrels of crude and refined products. Also, the FEA can require oil importers and refiners to store up to 3 per cent of their throughput from the preceding year. For the longer term (to be built in seven years after review again by Congress), the FEA will stockpile between 0.5 and 1 billion barrels of petroleum, according to sections 106 and 154-158 of the Energy Policy and Conservation Act of 1975 — hereafter referred to as the Energy Policy Act.7 In so doing the U. S. has for now apparently opted for a "strategic reserve" (an in-place storage that puts it in a position to thwart a full embargo) rather than an "emergency reserve" (a smaller, less costly reserve that depends on or insures against only a partial embargo) as is specified in the IEP.

7 An explanation in digest form of the provisions of this bill is found in the Senate Conference Reports #94-516 or the House Conference Reports #94-700 of December, 1975. Also, a brief summary is found in Caroline E. Mayer, "President, Congress End Energy Battle," Oil and Gas Journal, November 17, 1975, pp. 34-36.
In a related development the American Petroleum Institute (API) estimates that private storage capacity in the U. S. is 300 million barrels greater than during the oil embargo (up to a total of just under 2 billion barrels). Even if half of this is operating stock and the rest contained the same average fill ratio as in 1974 (20-30 per cent), commercial prudence has already set aside 30-40 days supply of net imports (200 to 300 million barrels divided by 7.2 million barrels per day of imports -- the average figure for crude and processed imports into the U. S. in 1976.

If roughly similar public plus private reserves have been provided for elsewhere in the IEA, the targeted protection agreed to in the IEP does or will soon exist. If the actual embargo insurance promised also exists, the psychological assurance of shared oil should provide a strong incentive for the members with high import dependence to actually use these reserves at the onset of an embargo to meet ongoing demands, rather than to hoard them for military security.

b. Sharing Commitments

A second part of the security system requires each participating country to have a contingency program to conserve available oil, that can be activated in time of emergency and that is capable of restraining demand by the amounts specified in the Agreement.

8"Private Oil-Storage Capacity Up 300 Million Barrels Since Embargo," Oil and Gas Journal, May 24, 1976, p. 36.
The Energy Policy Act vests standby emergency power in the U. S. President to order gasoline rationing and to order power plants and major industrial plants to convert from oil to coal power. It is most convenient to detail the specified restraint amounts when discussing the third part of the sharing system.

This last part of the emergency scheme lays out a hardship sharing plan that is to be activated when the group or any member experiences or is threatened with a 7 per cent reduction of its oil supplies (from a base figure consisting of the average of final consumption figures for the country from the most recent four quarters for which information is available). More stringent restraint and sharing measures are specified in the agreement if the deficiency reaches 12 per cent or more. For the U. S. and Canada the 7 per cent or 12 per cent loss and activation can be applied to their Eastern Regions, since their domestic markets are not completely integrated.

The oil shortage percentages that activate the sharing scheme are based on a reduction in total oil supplies, not just in oil imports. As such, countries with greater import proportions in their domestic consumption have greater protection under the plan. For instance, if the Eastern U. S. imports 60 per cent of its consumption, and Japan imports 90 per cent of its consumption, the


the former must lose over 11.7 per cent of its imports to receive help, while the latter receives help when it is denied only 7.8 per cent of its normal imports.

By accepting this agreement the U. S. pledged its own oil resources to a program which may be activated against its will by a majority decision of an international body. In practice, of course, only under the most extreme emergency would the U. S. have to share any of its domestic production with the other IEA countries. Its obligations could almost always be fulfilled by diverting some of the imports still flowing to the U. S.

Two examples using Table 6-1 are the best way to enumerate the sharing procedure specified in this plan. Assume the IEA's total oil consumption is 1000 barrels per day and is divided among the various member countries as the percentages in the table, column 1 indicate (i.e., the U. S. consumes 535 bbls/day).

First, say the oil supplies for the U. S. are cut back by 10 per cent (53.5 blls/day), and that no other IEA country is embargoed (so the oil shortage for the IEA is 5.35 per cent, or less than 7 per cent for the group as a whole). The U. S. would have to cut back its own consumption by 7 per cent (37.5 bbls/day) with its emergency demand-restraint measures, and it would have an

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<table>
<thead>
<tr>
<th>Member</th>
<th>% of IEA Oil Consumption</th>
<th>% of IEA Oil Production</th>
<th>% of net IEA Oil Imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>5.2%</td>
<td>13.5%</td>
<td>1.1%</td>
</tr>
<tr>
<td>W. Germany</td>
<td>7.5%</td>
<td>1.1%</td>
<td>10.7%</td>
</tr>
<tr>
<td>Italy</td>
<td>4.7%</td>
<td>0.2%</td>
<td>6.9%</td>
</tr>
<tr>
<td>Japan</td>
<td>12.1%</td>
<td>0.1%</td>
<td>18.0%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>5.3%</td>
<td>0</td>
<td>7.9%</td>
</tr>
<tr>
<td>United States</td>
<td>53.5%</td>
<td>83.3%</td>
<td>38.8%</td>
</tr>
<tr>
<td>Other IEA*</td>
<td>11.7%</td>
<td>1.7%</td>
<td>16.6%</td>
</tr>
<tr>
<td>Total IEA</td>
<td>100%</td>
<td>99.9%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Calculated from data in the Monthly Energy Review of the Federal Energy Administration (FEA), various issues; Oil and Gas Journal, July 26, 1976.

* Includes Austria, Belgium, Denmark, Greece, Ireland, Luxembourg, the Netherlands, New Zealand, Spain, Sweden, Switzerland, and Turkey.
"allocation right" to 16 bbls/day (53.5 - 37.5) from the other IEA countries. These other countries would either restrain their own demand or draw down their emergency reserves, or both, in amounts calculated on the basis of their individual daily consumption, and sufficient to together provide the U. S. with 16 barrels of oil per day. For example, Japan would be expected to provide the U. S. "shortfall" times its share of the non-U. S., IEA oil consumption (16 x \[ \frac{121}{1000} \times \frac{535}{535} = 4.2 \text{ bbls/day} \]), Germany 2.6 bbls/day, the U. K. 1.8 bbls/day, Italy 1.6 bbls/day, Canada 1.8 bbls/day, and the "others" 4 bbls/day.

Second, assume only the three individually listed European countries suffer 60 per cent cut back in their oil supplies (60 per cent of 175 bbls/day equals a loss of 105 bbls/day). Since the group's supply is cut by more than 7 per cent (by 10.5 per cent), all members must reduce their own consumption by 7 per cent to get their "permissible consumption." "Total permissible consumption" for the group would then be 930 bbls/day (1000 x 0.93). The embargoed countries, though, would still not be receiving the portion they would be entitled to out of the oil available to the group. Thus, each would have a "supply right" equal to its "permissible consumption" less its "emergency reserve drawdown obligation" ("erdo"), which would have to be supplied by other members. The "erdo" is equal to the individual country's share of the total emergency reserve (70 days of imports for the country divided by 70 days of imports for the whole group) times the group's
"shortfall." The "shortfall" is equal to "total permissible consumption" less total actual supplies \[930 - (1000 - 105) = 35 \text{ bbls/day}\]. Note that each country's emergency reserve or import share is given in column 3 of the table.

In this situation the "erdo" for Germany is 0.107 times 35 bbls/day or 3.7 bbls/day. This says that when Germany's oil supply is cut from 75 bbls/day to 30 bbls/day it would: (1) restrain demand to 69.8 bbls/day (75 x 0.93); (2) draw down its emergency reserves at the rate of 3.7 bbls/day; and (3) be entitled to 36.1 bbls/day \[69.8 - (3.7 + 30)\] from other, more fortunate, IEA countries. Other embargoed members would have equivalent "supply rights." Conversely, the U. S. would have an obligation to supply some of the crude to fulfill the commitment to these countries. Its "erdo" would be 0.388 times 35 or 13.6 bbls/day. Its "permissible consumption" would be 0.93 times 535 or 497.6 bbls/day. So, it must drawdown its emergency reserves at the rate of 13.6 bbls/day and must allocate 51 bbls/day \[13.6 + (0.07)(535)\] to others. Japan, Canada, and the "other IEA" countries in the IEA would have similar obligations totaling 32.8 bbls/day. Combined with the "erdo" of the three embargoed countries (8.9 bbls/day) and the 40 per cent of normal supplies they still get, Germany, Italy, and Britain would each have available 93 per cent or their normal demand (69.8, 43.7, and 49.3 bbls/day, respectively). If the group's emergency reserve depletion of 35 bbls/day persisted long enough to use up half of the total reserves, the Governing
Board of the Agency is directed to propose new measures, as say further demand-restraint, to meet the situation. Unanimous approval is required to impose these extra obligations on the Participating Countries, though.

If allocation is required, this whole emergency procedure is to be carried out by the oil companies operating under IEA supervision. The petroleum products are to be distributed, insofar as is possible, through normal channels and at market prices. Deadlines for implementing these emergency measures are set within the Agreement at 15 days after the finding of reduction. In effect, the oil companies have the responsibility for devising and carrying out the practical side of these measures.\(^\text{12}\) The Energy Policy Act of 1975, the Justice Department, and Federal Trade Commission have all granted the U. S. oil companies participating in this coordination scheme immunity from antitrust prosecution.\(^\text{13}\)

\(^{12}\) The Agency's managing board approved an "Emergency Management Manual," characterized as a detailed "pushbutton" energy sharing program in May, 1976. "International Energy Agency Backs ...," \textit{op. cit.} Its details have not been made public. Presumably the adoption of this manual reflects the fact that the major companies have completed drafting a cooperative allocation plan.

\(^{13}\) Section 252 of the Energy Policy Act and "U. S. Firms Join IEA Supply Program," \textit{Oil and Gas Journal}, April 19, 1976, p. 43.
c. **Importance of Specified Procedures**

The fact that this emergency allocation plan is in place should have at least two effects upon future behavior related to the oil market. First, it is expected to deter both general and specific embargoes in the future, since the sharing plan automatically renders an embargo directed at one (or a subgroup of IEA members) an embargo against a prepared group of all seventeen. Second, it reduces the leverage that an embargo threat gives oil-exporters on the direction of the national policies pursued by heavily oil-import dependent industrial economies. The political benefits of oil derived influence in certain Western nations (resulting from the vitalness of the import commodity controlled by OPEC or OAPEC) should thereby be reduced. In other words, part of the political attractiveness of the oil cartel — ability to

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14 Although Norway is not part of the automatic sharing scheme, its surplus oil production capacity being developed in the North Sea would probably be available in any serious emergency to help the IEA weather a supply interruption, much as the U. S. aided a European Community oil sharing scheme during the Suez crisis in 1956.

15 R. D. Hansen comments in two different articles that the OPEC countries have derived just such a political benefit from their collective action. A portion of their status and influence with other LDC's is based on the fact that "Most Asians, Africans, and Latin Americans still see the situation as oil-exporter 'David' bringing down the industrial giant 'Goliath,'" which in turn is due to "latent hostility toward the world's rich countries that enables the South [a euphemism for LDC's] to place a premium on the psychic rewards of seeing Europe and Japan in periods of panic which outweigh their own suffering." "The Politics of Scarcity," The U. S. and the Developing World: Agenda for Action 1974, ed. James W. Howe (New York: Praeger, 1974), p. 46; and "The Political Economy of North South Relations — How Much Change?" International Organization, Vol. XXIX, No. 4 (Autumn, 1975), pp. 926–27.
alter policy or induce panic in importing nations — is hereby reduced. This in-place sharing scheme should cause a commensurate weakening of the bond among the oil-exporting nations.

2. Information and Joint Regulation

The information system and the provision of recurring oil company-country consultations is intended to provide another kind of insurance. The OECD secretariat operates the information system on a permanent basis and collects two types of information. One kind covers the activities of the oil companies and includes such information as corporate structure, crude access, rates of production, and prices. The other kind of data is collected on each country to insure the efficient operation of the emergency measures. It includes information on such things as oil consumption and supply, demand-restraint measures, and reserve levels.

Ulf Lantzke suggests that, until the oil crisis in 1973, the OECD countries worked under the assumption that a reliable assessment of the world market situation would be easy to obtain. During the crisis this proved to be untrue. Though these governments did exchange information readily and the major oil companies managed to more or less equally distribute the available crude oil, assumptions regarding the supply situation had to be constantly revised. The continuous information system and assessment on this

one market by the IEA should prevent some of the uncertainty and anxiety that surrounded the last embargo from worrying the governments of these oil-importing nations in another crisis. Further, it provides for collection of information that is required by members to monitor how well their collaborators are abiding by their commitments to the group.

The consultation provision seems to have been the major requirement of several of the smaller countries for their participation in the IEA. The countries that are not bases for one of the multinational oil companies were (and probably are still) concerned about their inability to supervise the activities of the companies on which they depend so heavily. In response some have tried to build up their own national companies — ENI in Italy, OMV in Austria, Statoil in Norway, and Deminex in Germany are examples — to achieve more confidence in a secure supply. This provision in the IEP works towards the same target by guaranteeing the smaller countries the same degree of information on oil prices and emergency availability as the large countries. Further, the Agreement legally commits the oil companies to follow a policy which is coordinated with that of the various governments in an emergency.

17 Sections 254 and 501-506 of the Energy Policy Act permit the Secretary of State to transmit this information that is collected by the FEA to the IEA.
3. Strength of the Embargo Protection

In sum, assuming the participating nations fulfill their obligations, three features of the IEP promise to make it easier for industrial nations to withstand an embargo in the future. First, an international governmental organization, rather than international oil companies that are subject to pressure from and influences by countries that have the crude oil these companies (with their expensive tankers, refineries, and marketing outlets) must have, will make allocations. Second, the agreement provides a certainty on the part of member countries that even in the event of an embargo they will have access to a known amount of oil. Third, the demand-restraint feature serves to assure all countries that each is cutting back its demand appropriately.

The narrow functional objectives of these sections, the similarity of national interests (an absence of which afflicts the efforts of many U. N. economic bodies), and the abandonment of the rule of unanimity (a problem in OECD and OPEC) are features which should facilitate the success of the IEA.18 Several further considerations, suggested from the earlier analysis of intergovernmental bodies, support this prediction. First, the initial recognition of the importance of relative competitive or economic status within the IEA, and the design and adoption of an elaborate and automatic mechanism to prevent oil supply disruptions from altering this order, institutionalizes a constraint to the cooperation among

nations. The failure of OPEC to acknowledge and incorporate this imperative initially, may be an important flaw in its makeup.

Second, the sharing scheme within the IEA is a standby arrangement, to be used in emergencies only. In effect, the participating countries do not have to act on their oil sharing commitments to each other except in a crisis situation. In time, the continuous coordination of prices or output restrictions may well require decision and actions by OPEC members to help or purposely avoid injuring rival producers. The consumer group is a more passive, insurance policy alliance, while the producer group is involved in an active, continuous process of collaboration, probably eventually requiring the active suppression of individual interest, even in normal operation. Third, the supply side coordination is being taken over by new national companies, with their inherent coordination limitations as indicated in the previous chapter and the last part of Chapter Four. The IEA emergency coordination scheme on the other hand relies on the established oil industry for the system's practical implementation. It recognizes the importance for successful joint action of insuring that the interests of the companies are made parallel with those of its members. Thus, abstracting from considerations like the characteristics of the crude oil (which may on balance aid the exporter cartel), the structure of the importer organization suggests that the IEA has several advantages over OPEC as a viable economic alliance. The
provisions of the IEP reviewed in this section will have little direct influence on the price charged by the oil cartel, however.

B. Import Reduction Measures

In pursuit of its second basic aim, the treaty for the IEA contains a provision calling for long term energy cooperation to reduce oil consumption and to stimulate the development of alternative energy sources (Chapter VII). The intermediate term aim of this endeavor is to shift world oil trade from a seller's market back towards a buyer's market by reducing the demand for OPEC oil. Since the IEA countries account for roughly 80 per cent of the world's oil imports, they have the collective demand side stature to accomplish this aim. The long term goal, because of the limited supply of crude oil, is to ease the replacement of petroleum as the dominant source of the world's energy. To coordinate efforts in this direction, the Agency's Governing Board has adopted a program that contains three principle elements.¹⁹ These elements are: (1) an obligation from participating governments to push energy conservation efforts in their respective countries; (2) an agreement to work towards removal of obstacles which might impede the accelerated development of indigenous fossil fuel resources; and (3) several specific measures to stimulate the development of

alternative energy sources. These obligations are less precisely specified than are those relating to embargo protection. The purpose of this examination is to provide a background for discussing how these various provisions might influence the monopoly power of the oil-exporter PEC.

1. Joint Conservation

The energy conservation obligations are recognized as only a partial measure in the attempt to reduce OPEC's monopoly power. Because of the long lead times required to find and institute the use of substitute oil and energy sources, conservation is the only near term way to reduce dependence of OPEC oil. Energy conservation is specifically defined by the OECD as reduction in the amount of energy consumed without significant reduction in Gross Domestic Product, general standard of living, or level of personal comfort. It is restricted to a reduction in the wasteful use of energy and an increase in the efficiency of conversion and end use.\(^\text{20}\) Parts of the conservation effort do require lead-in times for the conversion to a more energy efficient capital stock. But the avoidance of calling for the sacrifice of personal utility in the obligations should make their realization more certain, if less significant.

Feasible aggregate conservation in the next five to ten years may be itself be far from sufficient to bring real collective

pressure on OPEC. But, coordinated obligations should insure that one country's conservation is not offset by another's waste. This provision can enhance the ability of individual IEA governments to push conservation efforts. For instance, net imports of oil were down from 11 to 20 per cent in six IEA countries in 1975 from 1974 levels, down 1 to 10 per cent in six other IEA nations, and up 1 to 5 per cent in three IEA nations, while for the IEA area as a whole they were down 6 per cent. Though these differences might reflect temporarily varying conservation capacities and recession depths, established obligations are intended to assure that each country will exert similar conservation effort. The latter situation, in turn, might be expected to induce individual countries to more completely fulfill their import conservation capabilities. The establishment of fuel-efficiency standards for autos in the U. S. is a policy that works toward fulfilling these long term conservation obligations.

The more recent worry with energy conservation efforts seems to be that interest in eliminating waste may fade. Some

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21 Supra, p. 145.
22 "IEA Adopts (...)," op. cit., p. 32.
items such as liquor and tobacco, for instance, seem to follow a pattern of a drop in consumption just after increases in government taxation and adverse advertising, only to be followed by a rebound in demand as consumers adjust to the higher price. The unusual result of this behavior is that short run demand elasticity is higher than intermediate and long run demand elasticity. To avoid the same pattern in oil consumption, importer authorities may feel compelled to devise ways for periodically rekindling conservation interest.

2. Supply Addition Obstacles

The agreement to remove obstacles that might impede the accelerated development of indigenous energy resources seems to be the least firm of the IEA thrusts to date. Soon after the establishment of the IEA the U. S. companies were trying to pressure Norway, with its huge potential reserves in the North and Norwegian Seas, to join by threatening that her failure to do so would limit access to U. S. offshore drilling equipment. Norway refused to become a regular member of the IEA because its government insisted on the exclusive right to limit and control the development and output of its offshore areas. To the extent that Norway's refusal to join inhibits the development of its offshore reserves, 

25 Ian Smart, op. cit., p. 265.

26 The New York Times, November 13, 1974. The chief factors in this insistence seem to have been the environmental concerns expressed by its important fishing industry, and the attempt to assure the U. S. S. R. of its promise that the oil rigs would not
the IEA goal of encouraging the development of substitutes for OPEC crude is frustrated.

Also, the cooperation package under study requires a major shift in the exploration policies of several European members. This package involves a commitment that no preference be given to national companies in the allocation of development projects. However, current license allocation policies in Denmark, the United Kingdom, and Ireland require that exploration companies, if not of national origin, should be nationally registered. Policies, such as the one in the United Kingdom which gives the national oil company (BNOC) first refusal over unlicensed (leased) blocks in the North Sea adjacent to ones where oil is found or in a block where an operator wishes to retire, can dampen private incentive to explore in IEA territory. Companies that help finance and explore a lease lose out on the right to capitalize on the potential value of proximate areas which their finds make promising.

The major obstacle to added indigenous supply to which most IEA members point (in defense of their own policies) is the control of the price of domestically produced crude oil in the


The belief is that oil companies are thereby encouraged to concentrate on more profitable non-U.S. exploration and production. Even the U.S. program to increase domestic crude oil prices at up to 10 per cent per year would continue to lag behind world prices which could increase at or close to that rate for several years.

The cooperative agreement among the IEA representatives is intended to allow wider, more profitable access to and thus swifter development of indigenous crude oil resources. Political constraints imposed by insular national interests promise to make the negotiating costs of achieving this degree of cooperation quite high. In view of the vulnerability the oil-exporter PEC may have to the pressure of entry into the world energy market, the pay off to efforts aimed at changing national licensing and price control laws can be substantial.

3. Indigenous Fuel Development

The measures to stimulate investment in energy development involve: (1) a project-by-project approach; (2) a common minimum safeguard price (CMSP) of U.S. $7 per barrel for imported oil; and (3) a joint strategy for research and development. The project-by-project approach denotes efforts by expert groups within an IEA subgroup to develop and execute cooperative programs in

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sixteen specific areas. Those areas where joint programs were in progress in 1976 include coal technology and nuclear reactor safety. Those areas where cooperative efforts had advanced through the planning stage by early 1976 were radioactive waste management, controlled thermonuclear fusion, conservation, solar heating and cooling, hydrogen extraction from water, energy from municipal and industrial waste, and waste heat utilization. Seven more areas for the exploration of mutual interests in cooperative work were approved in November, 1975. These are the study of high temperature reactors for process heat, geothermal energy, solar power systems, wave power, wind energy, ocean thermal energy, and biomass conversion.

The long lead-in times required to institute application of the products of these research efforts means their effect on the oil market will not be significant until the 1980's at the earliest. The development and funding of all these projects would commit the IEA nations to a policy of adjusting to high energy prices and to a comprehensive and diversified energy resource use program. As such, future excessive dependence on one energy source, with its dangerous market control potential, is less likely. At the same time these countries seem to hereby be acquiring a vested interest

in continuing the present level of oil prices. Olsen suggests that this program is based on an extrapolation of the 1973-43 conditions, which may not persist. 30

A provision with the same inherent dangers and diversification benefits is the $7 CMSP. The intent of this measure is threefold. First, it seeks to insure new domestic investment in conventional sources of fossil fuels against predatory pricing by OPEC members, should they decide to exercise their significant cost advantage in the face of this new competition. Second, it serves to spread the risk of providing this insurance to most of the industrialized world. If the OPEC price does fall below $7 per barrel, industries in nations like Japan and Germany would be prevented from gaining competitive advantage over U. S., British, and Canadian energy users, who would be committed to higher cost domestic sources. Third, it should prevent a surge in the quantity of domestic demand should the world oil price fall very far. If permitted, a resurgence of consumption would return the IEA to a vulnerable level of dependence on unreliable oil sources.

The concern with this consumption stimulating possibility must have outweighed the efficiency advantages of protecting domestic producers with direct subsidies (rather than the CMSP) in the minds of the IEA directors. The across-the-board guarantee

30U. S. Congress, Senate, Multinational Subcommittee of the Foreign Relations Committee, Multinational Hearings, 94th Congress, 1st session, 1975, part 11, p. 231.
in the CMSP can shelter high cost producers and can give excessive profits to low cost producers. If the price does dip below the CMSP, however, the energy consumer, rather than the government and the general taxpayer, subsidize the domestic producer.

The IEA understanding commits member nations to use quotas, tariffs, and/or variable levies to implement the CMSP.\textsuperscript{31} The tariff or levy guarantee should not protect oil-exporters. If the world price falls to say $6 per barrel, the OPEC exporter gets the $6, the domestic oil buyer pays $7, and the importer government collects $1 per barrel of imported oil. The use of a quota system to implement CMSF could present problems. The particular advantage of the quota tool, ability to restrain even highly inelastic import demand to a target level, would appear unimportant to the CMSP intent of promoting domestic energy investment. Further, the complicated task of designing and revising quota amounts so as to insure the floor of $7 per barrel would make it an administratively expensive tool to use to implement the CMSP.

The multiple purposes of this measure may severely limit its effectiveness at achieving any one of these purposes. More importantly, the Energy Policy Act specifically states:

The President shall have no authority, under this Act [or the Emergency Petroleum Act of 1973]..., to pre¬
scribe minimum prices for crude oil (or any classification
thereof), residual fuel oil, or any refined petroleum
product.32

Without amendment, this wording seems to preclude U. S. Government participation in a price guarantee, whether it be domestically or internationally instituted. Forbiddance of permission to set a price floor is probably aimed more at preventing U. S. partici¬
cipation in an oil ICA, but it also may prevent CMSP participation. Political considerations appear to be important in this prohibition.
The practical difficulty of identifying and insuring that all foreign crude carries a $7 price leaves room for importer and refiner cheating in their use of such a fungible commodity. Also, that activity may put the Department of Interior in the 1980's in the same predicament as the Department of Agriculture in the 1950's.33 Consumer reaction might make the enforcement of a high internal price for so vital a commodity impossible for some IEA governments, if the world oil price does break. This danger would seem most likely in the case of countries like Japan and Italy, which will have little domestic production to protect and thus, little domestic support for a policy of artificially high prices.

32Section 402.

33Arthur Okun, Multinational Hearings, part 11, op. cit., p. 55.
Because of the enforcement difficulties that the CMSP may encounter, its ability to avert a resurgence in the IEA demand for oil imports, should the cartel price break, could be more apparent than real. Uncertainty about implementation may also undermine the guarantee it is supposed to provide to domestic investors. The latter drawback is less likely if the participating governments do ratify the CMSP proposal; they would appear to be committed to guaranteeing high cost energy investments even if the final consumers cannot be forced to pay the equivalent of $7 per barrel of oil for it.

The overall research and development strategy of the IEA seems to involve two key points, one less controversial than the other. First, in developing cooperative programs "the lead country or organization" approach seems to have been adopted as the most effective. Individual countries are ahead in the development of specific kinds of technology -- the U. S. in solar and nuclear energy production, the Europeans in the field of coal gasification and liquefaction, the Scandinavians in the field of home insulation, and the Japanese in the field of cleaning stack emissions of coal burning electricity generation. The lead country in the cooperative efforts apparently takes over responsibility for further efforts under joint government auspices.

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in the development of technology in its comparative advantage field. Other interested IEA government agencies are apparently expected to provide support research and funds in exchange for access to advances.

The second part of the R & D strategy -- total member access to all new energy developments sponsored by the agency -- has led to proprietary concerns over intellectual advances. The provision is obviously intended to speed the widest possible adoption of energy alternatives and savings devices, and thereby intensify the cutback pressure on OPEC production. However, by undercutting the rationale for patents it does risk the opposite effect -- slowing the spread of new technologies. In legally reserving the right to use a new innovation to the inventor of record, patent laws serve two purposes. First, they stimulate inventive activity by guaranteeing the right to collect the monopoly rewards for the commercial utilization of the invention for some definite period. Second, they speed the widespread introduction of the new technology by reducing the need to keep it secret so as to preserve access to these rewards. An IEA commitment to share breakthroughs, that does not adequately protect commercial or national proprietary interests of the developer, may induce secrecy and the concomitant slowing of the disclosure of oil saving technology.

C. **Summary Assessment**

Because of the newness of the IEA and the long range nature of many of its programs, an empirical assessment of its effectiveness is not yet possible. The various comments about its programs reviewed or developed in this chapter provide some insights, though, about where consumer cooperation should be most effective. The detailed development of the mutual aid scheme for emergencies along with the current progress toward its implementation promises a reduction of the importance of the embargo factor in world oil market relations. Governments in oil-importing countries should have greater certainty and confidence about their ability to minimize the effect of an embargo. The accumulated financial surplus of OPEC and OAPEC nations may increase their ability to apply an embargo. However, oil exports would have to be withheld for a much longer period than was done in 1973-74, if the IEA sharing scheme works as it is designed.

The information and consultation sections facilitate collaboration by increasing the ability of peers to monitor both each others' diligence and the oil companies' performance. The danger of these provisions is that they may also lay the groundwork for development of a sort of permanent international regulatory agency along the lines of the U. S. Federal Power Commission. Oil may have come to occupy a position in modern society similar to that of the railroads or public utilities -- "vitally affected with the public interest." However, the sale of petroleum lacks the
common property justification for regulation that oil producing
has. Sales by the industry have been effectively conducted on a
competitive basis, except in emergencies. With the added dif-
ficulty of the prospect of regulation by a committee of sovereigns,
rather than a single government, this extension of these provisions
should be considered only as a last resort.

Enough data to permit the preparation of an overall assess-
ment of the effectiveness of the import reduction measures in
various stages of implementation by the IEA has not yet accumulated.
Even if those measures together have the capability to aggravate
the price control task of OPEC in time, it is far from certain all
will be tried. Aggregate conservation potential is limited for at
least the next five to ten years in the extent to which it can put
pressure on the entire cartel. Attempts to remove obstacles to
international exploration and development of the indigenous crude
oil reserves of individual members may be frustrated by participants
clinging to nationalistic priority. Joint sponsorship of alterna-
tive energy source development is in danger of institutionalizing
the current high level of relative energy prices and/or of violating
proprietary reasons for allowing the market to distribute innova-
tions. The distinct possibility exists that the CMSP will not be
adopted and that even if is, it will not be enforced should
the need arise.
If the IEA programs could be made to work approximately as well as their framers intend, they can have several effects on the oil-exporter PEC. The price reduction influences of some IEA programs is the subject of the last half of the next chapter.
CHAPTER SEVEN

SOME EFFECT OF EXISTING AND POTENTIAL IEA
PROGRAMS ON POLITICAL-ECONOMIC PRICING

The International Energy Agency achieved legitimacy during 1976, when most of its provisional participants (including the U.S.) had enacted enabling legislation for at least some of its programs. The emergency sharing scheme, information, and consultation provisions promise to help its members weather another oil embargo with less anxiety and discomfort. Plans for long range joint efforts that are before the participants are not as well developed and may enjoy less enthusiastic support. Though the IEA is in a sense a consumer PEC, it should be plagued with fewer of the internal problems that go with that composition than should OPEC, because of the more moderate scope of these collusive activities. More aggressive actions by the IEA (or major consumer nations) have been contemplated, however.¹ The task of this chapter is to analyze the impact that

various roles assigned and suggested for the IEA might have on the durability and price selection of the political-economic coalition of oil-exporters.

The presence of two formal organizations, one representing most of the crude oil export capability in the world and the other representing most of the petroleum import demand in the world, implies the evolution of a bilateral monopoly in this international market. Indeed, the one clause of the IEP that was not mentioned in the previous chapter is a recommendation that participating nations endeavor to promote cooperation with oil producing countries and with other oil consuming countries. That provision may be envisioned as only an attempt to portray the IEA as something other than a brazen adversary of OPEC. However, if adopted by the membership, it does imply that the consumer group might not be opposed to the development of a bilateral monopoly arrangement with the producer group.

This chapter argues that a bilateral bargaining approach cannot be expected to provide any real benefit to oil consumers.  

Welfwirtschaftliches Archiv., Heft 2 (1976), pp. 264-70. With the exception of a warning by Houthakker, these discussions overlook the difficulty that a group of democratic nations (as compose the IEA) may have in implementing unified and daring responses concerning so vital a commodity as oil, or that such responses may only serve to solidify the OPEC group politically.

Moreover, the political-economic composition of the oil-exporter cartel amplifies the disadvantages of that response to IEA dependence on oil imports. This argument has two components. One, producers would hold the bargaining advantage for at least the next several years, and even in the long run, the IEA gains little and OPEC much from the establishment of a formal international commodity agreement for oil. Two, negotiated prices, amounts, and enforcement obligations foreclose a real opportunity that several IEA programs have for undermining the resolve of the oil-exporter PEC to maintain the present real price level.

A. Formal Bilateral Responses

Bilateral monopoly occurs when a monopolistic seller trades with a monopsonistic buyer. OPEC now has the power to set the price at which major exporters sell crude oil. Earlier chapters question whether this agreement is durable enough to permit that organization to engage in give-and-take bargaining with a unified adversary. Pending subsequent support, assume that if the proper inducement arises, OPEC would be granted the necessary flexibility on behalf of its members.

1. Bilateral Cartel Bargaining

Suppose the major oil consuming countries set up exclusive government purchasing agents for imports, whose activities are
coordinated through the IEA. With that structure authorities in
the importer nations would be able to directly limit the demand
for OPEC exports and thereby be in a position to engage in bi-
lateral monopoly bargaining with the seller group. Figure 7-1 can
be used to depict the preferences of the two sides. Let $MC_s$ repre-
sent the marginal cost curve for the seller group. At prices
which the sellers considered fixed, $MC_s$ indicates the aggregate
quantities that would be supplied. A dominant buyer group may then
regard $MC_s$ as its average cost curve. Since the purchase of increased
quantities requires paying more for the intramarginal units as well
as the extra unit, the monopsonist faces a marginal cost curve ($MC_b$)
above its average cost curve ($MC_s$).

Assume that the monopsonistic buyer immediately resells
the commodity it purchases without incurring any further production
cost and that this agent is the sole outlet from which downstream
consumers can acquire the product. The average value of a barrel of

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$^3$ The Energy Policy Act directs the Federal Energy Admin-
istration to study and report to the U. S. Congress on the first
part of this proposal. A franchised monopsony or oligopsony of
international oil companies, rather than importer governments, seems
to be excluded for two reasons. One, there is the fear that the
companies do not have the leverage or will to bargain very success-
fully with oil producing nations. Two, there is a widespread con-
viction that profit making companies will not pass-through, as fully
to consumers, the gains they might extract in bilateral bargaining
with OPEC as would a public agency.

$^4$ For a justification of rising marginal cost, see footnote
17 of Chapter Three, page 50.
FIGURE 7-1
Bilateral Monopoly in Oil
oil to the monopsonist is equal to the price at which it can be resold. The average value product curve (AVP) is then identical to the end product (oil imports) demand curve. Marginal to this curve is a marginal revenue product curve (MRP), which shows the revenue associated with buying and then reselling an extra unit of the commodity. The monopsonist would elect to operate at output $Q_b$ and to pay the seller $P^b_m$ if it were a profit maximizer, for there its marginal cost equals its marginal revenue. If the monopsonist preferred competitive distribution, it would choose a price $P_c$ and induce the seller group to increase output to $Q_c$.

In today's world oil market, buyer preferences do not dominate. Prices are set by the sellers and consumers select quantities along AVP. This curve therefore, represents the average revenue available to the seller. The curve that is marginal to AVP (MRP) represents the additional revenue derived from extra sales by the monopolist. The profit maximizing monopolist will impose a price of $P^s_m$ and an output of $Q_s$ on its customers. The task for a monopsonist in this situation becomes one of inducing the monopolist to lower the price it sets.

A monopsonist's bargaining leverage is its ability to limit the demand presented to the monopolist. The resolve of

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5This goal would permit consumer cartel governments to distribute the monopoly gain to their own second stage consumers by means of subsidies, tax reductions, rationing, etc.
democratic governments in industrial nations to force constituents accustomed to an energy intensive life style to accept artificial shortages of oil in hopes of pressuring OPEC to reduce its prices is probably not very great. Also, if this government buying operation follows the procedure of other public purchasing activities, winners and prices must be publicly announced. Information the producer cartel could use to monitor its price is thus provided. Hence, political constraints on officials can make the leverage of importer governments in formal, bilateral bargaining rather weak.

If the exporter cartel can suppress chiseling, even a successful conservation program in IEA countries may not be very efficient at driving oil prices down. Suppose the monopsonist reduces the import demand at each price by 25 percent, depicted in Figure 7-2a by a shift of the AVP curve taken from Figure 7-1 to AVP'. The commensurate change in MRP to MRP' decreases the profit maximizing quantity for the monopolist (Q_s to Q_s') much more than the profit maximizing price (P_m to P_m'). Actions which do not change the elasticity of demand at given prices generally have this

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6 This concern has been expressed by Congressmen during hearings in which proposals to impose reductions were discussed. U. S. Congress, Senate, Multinational Subcommittee of the Foreign Relations Committee, Multinational Hearings, 94th Congress, 1st session, 1975, part II.

7 Requirements for published bidding results are usually thought necessary to prevent abuses of public purchasing power by designated agents.
Figure 7-2
Impact of Conservation Efforts

(a)

(b)
Total revenue for the monopolist is cut significantly, but, since the product is a nonrenewable resource, the sale foregone now is not lost forever, or is not as damaging to sellers as it might be.

Successful conservation by importers may even reduce the elasticity of demand for petroleum. Since crude oil is used in a variety of ways, the least necessary consumptions of petroleum will be curtailed most under a general conservation regime. The composite elasticity derived from the demands that are still serviced is made less than was the case before limitations were imposed. Figure 7-2b demonstrates that, under conditions otherwise identical to those shown in Figure 7-2a, the profit maximizing price for the monopolist could be increased (from $P^m_a$ to $P^m_s$) if the assumed 25 percent import reduction at the initial price results in a less elastic average value product ($AVP^m$) or demand curve. In either case the key

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8 For a formal proof of this outcome, see Joan Robinson, *The Economics of Imperfect Competition* (2nd Ed.; New York: St. Martin's Press, 1969), pp. 67-70. Paraphrasing Professor Robinson, the extent to which monopoly price must decrease will depend on the rate at which costs are rising and the amount of the decrease in demand. Only if the monopolist's marginal cost rises sharply with output (is quite inelastic) and demand is greatly reduced will the profit maximizing price fall significantly. In fact, with only moderate elasticity in the MC or moderate reductions in quantity demanded at $P^m_s$, the monopolist's profit maximizing price may even rise in response to conservation efforts by buyers.


finding is that the price choice of the unified monopolist is minimally affected by conservation alone.

The assertion has also been made that even if bilateral negotiations and obligations do not lead to lower prices, the consumers still benefit. Buyer-seller cooperation supposedly would reduce chances for economic disruption caused by another supply interruption. In light of the recent experience of the private, international oil companies with negotiated concessions from OPEC members, promises by the latter not to use oil embargos may not be very binding. The IEA stockpiling and sharing scheme could be necessary to insure the fulfillment of that obligation by exporters. If the emergency sharing scheme among importer country governments does effectively discourage embargos, the OPEC commitment to renounce them costs producers very little.

In contrast to the small benefit promised by a bilateral monopoly to oil consumers, producers obtain substantial benefit. That arrangement (complete with mutual obligations) would serve to validate monopoly control in a major product market where the basic economic argument for orderly markets does not hold. Annual "oil crops" do not fluctuate as do crops of wheat, sugar, coffee, etc.

11Kosobud, op. cit.
because of uncontrollable weather conditions. The producer cartel also gains improved enforcement (over that provided by only its internal agreement) of the price established via negotiation with buyers. Complicity by at least two parties, one on each side of the market, is required to violate the agreement if the consumer cartel includes all significant importers. Data on transactions between the two groups would reflect any significant cheating.

2. Noncooperative Coercion

In an attempt to avert this one-sided arrangement, IEA nations could avoid forming a negotiating front and seek to bring unilateral pressure on OPEC nations to reduce price. For example, quotas on oil imports by major oil consuming nations or for the IEA as a whole may be employed in place of an exclusive government purchasing operations. Quota tickets could be sold only for the quantity of oil that policy makers want to allow in. If the tickets are sold in secret and easily transferable, there is a greater likelihood of attracting chiseling within OPEC, since the identity of exporters and the prices they receive could be shielded from detection.13

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12 Arthur Okun, Multinational Hearings, op. cit., p. 51. The redistribution argument for aiding less developed countries can still make this support worthwhile on equity grounds. Drawbacks to foreign aid in this form are mentioned on page 160, however.

13 This type of response is what Professor Adelman has been pushing. For a sketch of his proposal, see Multinational Hearings, op. cit., pp. 4-5 and 13-15 or The Petroleum Economist, XLIII, No. 6 (June, 1976), p. 207.
Responding to an export cartel by imposing a general import quota has a basic conceptual flaw, however. Any potential price cutter is presented with a perfectly inelastic demand curve over an attainable region by that action. Consequently, a ceiling is put on the benefits but not the costs that chiseling can generate for an individual price maker. Relative to tariffs, though, quotas are considered flexible instruments that could be changed fairly quickly as needed. The incentive problem connected with a general import quota could be overcome then with a promise of and probably ability to enlarge them as prices are cut. Such a promise places the IEA into a direct confrontational relationship with OPEC, and risks returning importers to a more vulnerable level of dependence on insecure sources of crude oil as quotas are relaxed.

Presumably, a selective quota system could be formulated to avoid limiting the potential gain available to OPEC chiselers. Very limited quotas might be assigned to imports from nations that have threatened or attempted to withhold exports or to imports of (so-called sour crude) oil that is not as environmentally acceptable as is other (sweet crude) oil. Where these differences are associated with key producers, those with embargo reputations or largely sour crude oil output would be forced to accept a disproportionate share of the overcapacity in OPEC. If this measure of relative

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well-being within that cartel is important to member nations, some may begin price chiseling in an attempt to capture sales not covered by import quotas. However, it is doubtful that the challenge presented to OPEC by this conservation tactic would be less prominent than that of a general import quota with chiseling rewards offered explicitly. Further, authorities in importing countries would face the more complicated task of monitoring not only the size but also the source of oil shipments. Due to the fungibility of crude oil, this additional requirement can prove quite burdensome.

Another way to avoid the rigidity flaw of the general import quota on oil is through the use of a tariff on OPEC exports. If oil demand is reasonably elastic, a result similar to that of the quota is achieved. In contrast to the quota, though, exporters willing to chisel are not presented with a perfectly inelastic demand if they attract sales from other than their OPEC associates. Simulations reported by Houthakker indicate that a common IEA tariff of $3.25 per barrel (with demand elasticities in the range of -0.25 to -1) would reduce oil imports to a range (18.5 MBD to 10.9 MBD in 1980 from the Middle East) that should severely strain OPEC stability.\textsuperscript{15} Aside from uncertainty about the extent of elasticity in the demand for crude oil, the political difficulty that governments in importer countries will encounter in enforcing measures that

\textsuperscript{15}Op. cit., p. 32.
further inflate fuel prices and require obvious sacrifice by constituents can dissuade authorities from attempting to use tariff leverage on OPEC. Appreciation of the inefficiency (described above) of a response that may do little more than reduce the volume of oil consumed can add to this reluctance.

Earlier political economic analysis infers that antagonistic efforts, such as exercising formal or informal monopsony power, may have a perverse effect on the exporter PEC. A serious weakness in a nation-state cartel is the difficulty that its members are expected to have in overcoming antipathy for formal prorationing. Overt actions by the IEA nations might induce OPEC producers to scramble for markets on an individual basis. It is also a real possibility that aggressive public purchasing, quotas, and/or tariffs will lead to the opposite behavior. A direct challenge could induce major oil-exporting nations to accept an output allocation scheme as a necessary evil to defend what they consider to be a just price. The group of major importer nations may well be perceived as a common enemy, much as Israel and the U. S. were by OAPEC in 1973. In effect, a focal point for exporter indignation is established which can push individualistic producers into joint controls they would not otherwise seriously consider. After all, the nations in the IEA group accepted an automatic emergency sharing scheme involving their domestic reserves only after experiencing the OAPEC embargo. The "David and Goliath" perspective that Hansen discusses may contribute to the desire by the less developed oil-exporters
to achieve a unified stand against the powerful industrial nations. 16

The common foe effect provides support for the earlier assumption that OPEC would adopt coordination tactics necessary to function as a bargaining unit with the right provocation. An influence that stabilizes OPEC further diminishes the chances that buyers can force oil prices down. Recall that import reduction alone is not likely to decrease the profit maximizing price for a unified monopolist. Total revenue and probably total profit available to the cartel would fall with demand restraint, though, and can lead to chiseling by members whose dissatisfaction cannot be controlled. In a cartel where outside threats have redirected member suspicion away from each other, there is the prospect that national producers would lose the willingness or ability to cheat on the group. By undermining the chiseling facility and incentive in the existing exporter cartel, a collective buyer venture may be the very condition that precludes the one chance conservation has for moving oil prices back toward a competitive level.

If less provocative actions are available to consumer interests, more favorable results may be envisioned by avoiding the adoption of a monopsony-like response to OPEC. Before elaborating the effects of some alternative importer responses to the

16 Supra, p. 185.
oil-exporter PEC, one additional kind of assistance the OPEC monopoly may derive from the IEA organization should be noted.

3. The Effect of Personal Motives

"Collegiality" relationships and attachment to the non-pecuniary rewards provided by international organizations could develop within the IEA, and thereby create an incentive to perpetuate the need for its existence. Resultant efforts might consist of propaganda accentuating the danger of OPEC and of the need for more than market inducements to develop energy alternatives to oil. Such publicity can strengthen OPEC by increasing the confidence of producers in the security of their market dominance. Perfecting information gathering and disseminating apparatus on the international oil market provides OPEC with unintended assistance by making it more difficult to secretly chisel. These suppositions do not impute sinister motives to IEA officials. Rather they suggest that for personal utility reasons, some joint activities that benefit IEA bureaucrats may, as a by-product, help stabilize the oil-export cartel.

The activities discussed in this and the previous sections are only potential. None of the direct countermeasures by consumer countries have been adopted. No evidence can be cited that OPEC has benefited from the functioning of the IEA or its officials. Can actions by the IEA which avoid confronting OPEC with an aggressive adversary bring real pressure on monopolistic prices?
B. Pricing Influence of Actual IEA Activities

Four specific measures have been adopted or are under consideration by the IEA. These include procedures to lessen the effect on the membership of another oil embargo by exporters, detailed conservation obligations, the removal of obstacles to the development of alternatives to fuel imports, and cooperative research into non-oil energy sources. The avowed purpose of these joint actions is to limit the influence that dependence on crude oil imports can exert on member economies. As such, they are less likely than the actions considered above to be perceived as an assault on oil producer objectives. The political-economic characteristics attributed to OPEC in Chapter Five open up some ways in which these relatively innocuous measures by IEA countries can undermine the unilateral pricing ability of the oil-exporter cartel.

1. Leverage of Substitution and Conservation

Non-mandatory fuel conservation by IEA countries sufficient to trigger an actual reduction in oil prices in the near future has been assigned rather limited potential in earlier analyses. OPEC appears to have the economic capability to accept substantial cuts in aggregates sales with very little sacrifice in development pace. Financial accumulations by some members enhance this capability to do with less generous oil income should a need arise.

Without an embodied external threat, the insistence on national sovereignty is more likely to enfeeble attempts by OPEC
officials to minimize joint sacrifice by reappointing the shutdown in production that may be imposed at the cartel price, however. Informal allocations of a reduction in output below expected levels are unlikely to achieve as much production cutback in the aggregate as are formal procedures. The collective capability of OPEC to frustrate indirect consumer attempts to induce price decreases is thereby less than that of an equivalent cartel that may have less aversion to centralized quota allocations. To succeed, the overall IEA strategy designed to bring pressure on oil price levels should not have to reduce the total demand for OPEC exports by 46 percent by 1980, as has been computed by C. A. Gebelein. Greater significance attached to political calculations by the national members of a cartel should make smaller reductions harmful to coordination. Since this limitation is only a qualitative factor, no quantitative correction to Gebelein's estimates can be offered.

As a simple illustrative example though, assume that pro-ratiating via an informal voluntary method is only able to achieve \( \frac{1}{2} \) the reduction in cartel output as is a formal program before some individual members must begin to make real spending sacrifices. Restricted to the former scheme, this cartel may be only able to collectively and voluntarily hold production below its estimated aggregate capacity of 38 MBD to 27.3 MBD, rather than 16.6 MBD — the

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absolute minimum amount these countries should have to produce to fund feasible spending projects in 1980 out of current income.\textsuperscript{18}

Concern for relative shares also suggests that a few financially strong members cannot be counted on to diligently protect any price chosen by a majority of the group. The importance of international status restricts the extent to which countries will serve as residual suppliers in the face of reduced or even moderately limited growth in demand for OPEC crude oil. The suspicion has been voiced that many oil producers within OPEC could come to treat the cartel price as a truly parametric figure and leave to the Persian Gulf sheikdoms the burden of accepting the lion's share of the required production restraint. The nation-state composition of the cartel companies and the prospects for future substitutes for OPEC oil should make the latter members wary of being put in this position.

Efforts by the IEA that advance the development of alternatives to crude oil imports can also create reapportionment problems for OPEC. In addition these activities provide leverage, absent from conservation efforts, that encourages the monopolist to decrease oil prices. Figure 7-3, which applies the analysis embodied in Figure 5-1 (page 151) to the initial conditions used in Figure 7-2 (page 212), can be used to explain. Without entry, the exporter group's demand curve is $D_g$ (AVP in Figure 7-2), and $D_e$ is the more elastic demand curve.

\textsuperscript{18}\textit{Ibid.}, p. 65 provides the first and last figures used in this example.
FIGURE 7-3
Impact of Displacement Efforts

(a)

Real Price

Oil Imports

(b)

Real Price

Oil Imports
curve for the producer group occasioned by the entry of non-OPEC sources into the energy market. The corresponding marginal revenue curves are $MR_g$ (equivalent to $MR_P$ in Figure 7-2) for $D_g$ and $MR_e$ for $D_e$. Panel 7-3a demonstrates that the price preferred by the monopolist falls from $P_m^g$ to $P_m^e$ following the entry alteration of its demand curve. This result contrasts with that found previously in connection with the simple monopsony restriction of demand, where elasticity would not be increased and may even be reduced. Further, this effect can be achieved with neither the risk of provoking greater OPEC unity nor the obligation of assisting in the maintenance of a negotiated price.

IEA aid that enhances the evolution of alternatives to oil imports can accelerate the development of elasticity in the demand for OPEC's product. Public subsidies that foster attempts to utilize nonconventional energy sources and government stockpiles on top of those accumulated by industry may even increase the elasticity of demand for oil imports beyond that due to the private efforts elicited by a price above the limit price ($P_1^e$). This latter effect is reflected by an additional rotation of the cartel's demand curve through $P_1^e$ to the curve $D_e'$ in Panel 7-3b. Following some displacement the revenue and output left to the producer cartel, and any residual suppliers in particular, that are committed to supporting $P_m^g$ is more likely to be reduced (to $P_m^gck_0$ at $0_k$, and to $ackh$ at $hk$ for the residual producer) as a consequence of IEA substitution programs. Some of these programs may even further
depress revenue and output to $P^a_m = Q_0$ and $anqh = hq$ for the cartel and the swing producer, respectively.

If the exporter cartel does adjust to $D_e$ (or $D_e'$), its revenue may not fall because at $P^a_m$ output is expanded to $Q_e$ (Panel 7-3a). Stress within the cartel will still develop, though not in the way depicted in Panel 7-3b. For nonresidual producers already operating at or near capacity, the expanded market at the reduced price ($P^a_m$) is of no benefit. Instead, their revenue actually falls with their stable output $Oh$, while the residual producer receives the revenue associated with the extra sales of $Q_s$ to $Q_e$. The key finding remains that, whether or not the monopolist chooses to lower his price, the development of alternative energy sources creates internal tension in a cartel where relative shares are important.

Figure 7-4 indicates the unusual result that this model imputes to the simultaneous development of new energy sources and the realization of conservation. The profit maximizing output ($Q_s$) for the seller group is found by the intersection of the $MC_s$ and the (unshown) $MR_g$ or $MRP$ curves, as in Figures 7-2a and 7-3a. As in Figure 7-3b initial revenue is split within the seller group between residual producers ($afQ_s = h$) and other producers ($P^a_m = hO$). With substitution, the demand curve for the cartel moves to $D_e$ and with reduced consumption it moves to a position like that indicated by $D_e''$. The offsetting effects may change the optimal output for the monopolist very little (or not at all as depicted), while reducing the preferred price to $P^a_m''$. Though aggregate
Figure 7-4
Combined Impacts of Displacement and Conservation
real revenue falls, the relative shares received by the firms or subgroups comprising the cartel do not change. That is, $P_m a'h_0/a'f'Q_h \equiv P_m a'h_0/a'f'Q_h$, so the political prerequisite to stable but informal collaboration is preserved.

This analysis has been conducted in static terms. Its findings extend to a secularly growing market (one where energy demand expands over time) if the growth in imports from the oil producer PEC is slowed below the growth in OPEC production potential and/or spending potential. To the extent that IEA support assists the search for alternative fuel sources, pressure on the oil monopoly to reduce prices is intensified. Politically inspired concern for relative position within the exporter cartel can disrupt efforts by the seller group to adjust to the altered conditions of demand for its product, whether caused by import substitution or by energy conservation. The development of additional fuel supplies and energy conservation combine to enhance the downward pressure on monopoly prices and revenues, but may alleviate some of the internal tension blocking a joint adjustment by OPEC.

By shifting attention to individual decision making it is possible to conceive of other ways that certain defensive IEA provisions can precipitate a fall in world oil prices.
2. Effects of a Floor Price for Imports

The full adoption of the common minimum safeguard price (CMSP) by the IEA may have the unseen benefit of tilting the decision of the individual exporter toward chiseling. Part of the cost weighed by the prospective price cutter in his decision to chisel on the group price is that he may set off a price war which will subside only when the price has fallen to the level of costs. The designation of a $7 price floor on imports by principal consumers (presumably their estimation of the long run cost of producing substitutes for OPEC oil), provides a focal point for export price. A level is established at which handsome profits are still afforded OPEC producers but at which a spiral of price cuts may spontaneously cease.19 The fruits of any chiseling below $7 per barrel must not only be increasingly shared with consumer governments but also more completely borne by displaced rivals. Any price cuts from above $7 will increase aggregate oil sales if there is any elasticity in the demand curve. Empty storage capacity can permit buyers to take advantage of such bargain prices quickly.

This effect can be demonstrated with a simple diagram, Figure 7-5. The demand curve that the individual member faces is given a kink at $7 by the CMSP. Chiseling down to a $7 per barrel price can increase the price cutter's sales volume by up to the

Figure 7-5

THE CMSP EFFECT

Landed Price

$12

$7

$2

0 a b c Oil Exports

d

floor price on imports
amount for two reasons. He gains sales at the expense of rivals and, to the extent that there is elasticity in the market demand, from the sales added to the market total. If many international oil companies are tied by long term purchase commitments to the crude oil of certain countries, most of the chiseler's increased volume would come from market expansion rather than from sales taken from rivals.

Further cuts below $7 will not lead to a change in final product price if the CMSF holds. Chiseling below this level will add to the sales of the price cutter only at the expense of displaced rivals (in the amount be for instance). The market cannot expand so further price cuts have less attraction for the potential price chiseler.

Perception of the zero sum nature of further price cuts below $7, and thus the greater potential they have for inciting destructive retaliation, may collectively convince the competitive chiselers that they have exhausted all the extra benefits they can reasonably hope to gain from chiseling. The prospect that this point of diminishing returns may be recognized by all chiselers can create the feeling that rounds of price reductions one may inadvertently set off will stop at that point. As such, the danger of causing the complete loss of monopoly benefits is less, or the (discounted) cost of chiseling is less.

A traditional internal policing method in a cartel -- dumping in a chiseling rival's market -- is also made even less
attractive by this retail price floor. With production costs so low relative to price throughout the cartel, the dominant producer cannot put immediate pressure on a rival who feels compelled to chisel. Price must be pushed to a small fraction of the current level to make it unprofitable for any member to continue production. The source of advantage the dominant member has is that its reserves permit it to outlast rivals — underselling as long as they can still produce and then returning to very high profit levels after they are pumped nearly dry. In Patinkin's words, "in the event of a price war, victory is not to the most efficient but to the one with the largest [financial] reserves." To the extent that a CMSF and supportive measures reflect the resolution of oil consumers to reduce imports (seemingly regardless of developments in the cartel), this ability to out-last could be of little use. By the time the chiselers have been exhausted or reformed, the market that is left to OPEC exports could be worth little relative to what it has cost to obtain. The certain $7 price now may look better than the uncertain prospect of one, even several times that size, in the remote future. Strenuous buyer efforts to develop alternatives may have displaced oil by the time the dominant firm has the market to itself.

Since it has come to appear that OPEC will not soon collapse by itself, the CMSF no longer seems in danger of needlessly perpetuating high oil prices. In time as IEA nations with little oil potential begin to use alternative high cost energy sources in place of oil — coal, nuclear, solar — the reluctance to underwrite this price may fade. Also, since the $7 figure may serve as a focal point for a regrouping of OPEC, should it collapse at the higher price, the importer governments may not have to perform the unpopular task of collecting import duties to defend the CMSF.

3. Importance of Individual Substitution

A sensitivity to relative position by members of OPEC also suggests that the IEA need not push its total access to breakthroughs policy too vigorously. If the flow of oil exports from individual OPEC members are concentrated on specific IEA members — Indonesia to Japan, Venezuela to the U. S., Libya and Algeria to Southern Europe, etc. — rather than spread uniformly over the whole IEA group, a technological breakthrough in one country can have a disruptive effect on OPEC. If Japan, say, institutes new technology that reduces its demand for Indonesian crude oil significantly, then this exporter will suffer a spurt in overcapacity if it is unable to find a roughly equivalent substitute buyer. If the Indonesian producing company has a high regard for its relative position, it will have to reduce price to induce buyers to move its oil to other
markets. Any such successful penetration will be countered by other national firms interested in their relative status.

The implication for the IEA is that there is less need to artificially stimulate the spread of energy breakthroughs. The PEC characteristics that OPEC should come to embody suggests that successful policies for countering OPEC need not concentrate just on bringing aggregate pressure on it. Pressure on the exports of selected countries can be more effective, given the current and predicted amount of overcapacity with which most of these exporters appear laden.

4. Pricing Consequence of Embargo Protection

Finally, there is a latent potential in the IEA to disrupt the oil PEC. The existence of the emergency sharing scheme promises to allow IEA nations to less painfully endure at least the early stages of another embargo. The prospect of a drawn out affair before tangible results are seen can make the attempt to apply another embargo for political or economic purposes undercut the oil cartel in one of two ways. One, some members may refuse to go along because they fear that the consumer country sharing scheme will cost them too much in interim lost sales relative to what it will ultimately gain. If this fear denies OPEC the ability to effectively come through on an embargo threat by some members, resentment may bar further cooperative efforts among these factions in the cartel. Two, less committed members may back out before an applied embargo has had much effect. Those that continue to shut off shipments risk
permanently losing markets and stature if and as their partial embargo continues. This reasoning suggests that another actual embargo may be as dangerous for OPEC as for the members of the IEA. As such, the sharing scheme can serve as the measure which undermines OPEC's apparent unity if it becomes too aggressive.

C. Summary of IEA Price Effects

Efforts by oil-import country authorities to set up a bilateral bargaining arrangement with OPEC would appear to be counterproductive. Monopsony efforts to nudge a price established by a monopolist down by limiting demand would be politically difficult to institute and probably ineffective even if applied. Worse, a good chance exists that that assertive response would solidify the producer cartel where national sovereignty would otherwise attenuate the bond among producers. Also, an organization of the world oil market would confirm monopoly control where justification on efficiency grounds is absent and where other developments might undermine the loose knit cartel.

IEA support for the discovery and utilization of substitutes for oil imports can result in the monopolist choosing a lower real price. Market displacement or conservation successes tend to disrupt the operation of a PEC where relative shares appear vital. In combination, these activities may neutralize each other's effect on the informal distribution of cartel profits, though they will certainly lower the total amount to be divided. The CMSP floor may
have an insidious influence on whether producers refrain from breaking the cartel price agreements. Political perspectives can also make the exporter cartel susceptible to fuel substitution or savings by individual oil importers and to hasty embargo bids. Whether or not these IEA inspired effects succeed at lowering price soon, they appear preferable to more direct assaults on the oil price determined by OPEC.
The goal of this study has been to sort out the effects that nationalization together with activation of the IEA might have on the world oil price. Three elements are analyzed. First, a review of the economic conditions found in the oil producer cartel was conducted. The result was the identification of both a difference in individual member interests over the profit maximizing price choice for the group and a set of structural features that may suppress dissatisfaction with a compromise choice. Second, an assessment was developed of how some noneconomic concerns, that might be injected into the oil-export cartel with the takeover of producing properties by member governments, tend to alter the effectiveness of that coalition. The basic outcome was a discovery that factors identified in literature on public enterprises and on international relations can enhance the incentive of major producing entities to act in concert, but may lessen their ability to do so. Third, utilizing these insights, the influences of projected and hypothetical activities of the IEA on the price decision and stability of OPEC were deduced. That reasoning indicates that mere conservation and/or monopsony bargaining are not as effective at inducing OPEC to reduce the real price of oil as other, less aggressive IEA activities can be.
A. Recap and Impressions

The thrust of the arguments supporting those conclusions can be summarized in about five paragraphs. An unusually tight market and a decline in the dominance of the oil majors in the world oil network coincided with and probably significantly contributed to the impressive performance by OPEC in the early and mid-1970's. Uncoordinated responses by the governments in large consumer countries also facilitated the initial efforts by oil-exporters to establish and uphold a fourfold increase in real oil prices. OPEC thus became established as a pricing force under very advantageous political and economic conditions, and its cohesiveness has not been seriously tested yet.

The nationalization of oil operations in the LDC's that do and may in time belong to OPEC appears inevitable due to a combination of cupidity, nationalistic fervor, and the vulnerable position of the foreign owners. January, 1976 seems to be a reasonable point from which to date the transformation of OPEC into a cartel of state enterprises. This change can give the oil companies more freedom to shop for bargain priced oil and can complicate the enforcement task for the cartel. Also, completion of the takeover phase terminates a need which encouraged solidarity by producer country governments; namely, the joint ability to prevent multinational oil companies from penalizing individual nations that expropriate oil properties. Despite the end of this inducement to combine, nationalization may have little effect on the stability of the exporter cartel because
of the strong tradition of monopolization on the supply side of the
oil market and of the continuation of importer equivocation about
whether and how to respond.

Pure economic cartels are expected to be unstable over the
long run because of the ever present chiseling incentive and the
growth of non-cartel competition. OPEC has a concentrated, high
entry barrier structure much like industries where firms seem to be
able to avoid competition for extended periods. Product peculiarities
support the collusive atmosphere by making secret chiseling more
difficult and by easing pressure to avoid output cutbacks. However,
the oil cartel also faces a difficult coordination task due to the
magnitude of its price-cost disparity, basic member differences about
the importance of potential competition, and its weak organizational
development. This last difficulty is reflected in the fact that
members have failed to establish consistent price differentials for
their heterogeneous products and have been unable to agree on quota
assignments. The persistence of an appreciation by individual mem-
bers of the advantage of coordinated over uncoordinated actions,
rather than formal prorationing, appears primarily responsible for
the economic stability that OPEC enjoys.

The political-economic considerations made more prominent
by nationalization can alter this balance in several ways. The
rallying property of common foes, the added dimension for conducting
internal bargaining, the bureaucratic rewards from joint action,
and various indirect forms of assistance provided by governments in large consumer areas can reinforce the economic glue that holds OPEC together. The jealousy by sovereigns on any kind of central agency with the power to pool the restriction capabilities of the diverse members, arbitrate disputes, and enforce group decisions constrains the cartel's ability to withstand export slumps. An abiding concern for relative shares and possible political inclination to maximize short term benefits can aggravate this source of instability in the oil-export PEC and can provide a lever by which discreet consumer force might lower the price.

The IEA has adopted programs that apparently make oil-importers much less vulnerable to an embargo by major exporters than was the case in 1973-1974. Joint actions that can bring pressure on OPEC to moderate oil prices have enjoyed less support by consumer country governments. The inaction seems traceable in part to a preoccupation by officials with short term costs and individual national priorities. Due to rigidities within the oil-exporter PEC, limited IEA achievements that permit or advance the development of energy alternatives and the realization of conservation may do more than lessen an oil-based balance of payments deficit. By increasing the elasticity of demand for imports, the promotion of energy substitutes and the installation of oil storage capacity can lower the monopoly oil price, particularly when aided by reduced consumption. Conservation that is not achieved at the expense of provoking
administered prorating can rupture the state of concord among oil-exporting nations.

B. Perspective

This analysis does not lead to a definitive prediction about the collapse of the OPEC cartel. The study does suggest that, though this new variant of international cartel enjoys some advantages over purely economic coalitions, it need not be considered more permanent. An examination of the effects that two recent developments, producer country nationalizations and a consumer country organization, can have, individually and jointly, on the durability of the current oil monopoly leads to this conclusion. The asymmetrical loss inflicted by prospective entry of energy alternatives and the inability to subdue sovereignty objections to transfer schemes that permit the implementation of a limit pricing strategy now, place the exporter cartel in a precarious position. An overly aggressive IEA may, however, provide the common foe or formal assistance that rescues OPEC from this danger.

By the beginning of 1977 a clear majority of the IEA nations had ratified the IEP and most of the larger members of OPEC had completed nationalizations. These developments are still quite recent and much of their effect appears to be long term in nature. Thus, the suppositions expressed herein cannot yet be subject to empirical test. With the accumulation of evidence on a longer
period since the beginning of 1977, such tests can become feasible. The value of the above effort is in isolating some effects that nationalizations and the IEA may have on the durability and price decision of the OPEC cartel. Future work in this area can aim at augmenting, refining, or rejecting the effects that have been identified as consequences of these two developments.
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