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

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  POLITICAL ECONOMIC CARTELS: AN ALTERNATIVE
APPROACH TO THE WORLD OIL MARKET.

THE LOUISIANA STATE UNIVERSITY AND
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POLITICAL ECONOMIC CARTELS: AN ALTERNATIVE

APPROACH TO THE WORLD OIL MARKET

A DISSERTATION

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Economics

by
Sam J. Fraser
B.S., Tulane University, 1970
M.S., Louisiana State University, 1972
August, 1978

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

World energy problems have claimed a large, albeit dimin-
ishing, 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 coun-
tries, 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 pro-
ducing 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 dimin-
ishing, 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.[1] Many economic analyses of price and output behavior and
prospects in the world oil market that emerged shortly after the

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[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 adapta-
tions 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 infla-
tion. 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

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[2]See, for example, Joseph A. Yager and Eleanor B. Steinberg,
Energy and U. S. Foreign Policy (Cambridge, Mass.: Ballinger
Publishing Co., 1975); the works on OPEC reviewed in 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; or Stephen W.
Salant, "Exhaustible Resources and Industrial Structure: A
Nash-Cournot Approach to the World Oil Market," Journal of Political
Economy, Vol. LXXXIV, No. 5 (October, 1976), pp. 1079-93.

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 asymetrical 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.[3] 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

[3]Exxon 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.[4] This period of jockeying can be separated into four phases reflecting the progressive growth in the host government share.[5]

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 governments. 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

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[4] Jahangir Amouzezer, "The Oil Story: Facts, Fiction, and Fair Play," Foreign Affairs, Vol. LI, No. 4 (July, 1973), pp. 679.

[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.[6] By 1970 this split had
reached about 75/25 as market prices slipped well below the
stabilized posted prices.

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[6]"The Birth of OPEC, and How It Grew," Business Week,
January 13, 1975, p. 79.

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 2-1

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

Country	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Saudi Arabia	$0.758	$0.750	$0.755	$0.765	$0.787	$0.820	$0.832	$0.834	$0.848	$0.878	$0.871
Kuwait	0.778	0.764	0.744	0.748	0.743	0.769	0.789	0.784	0.793	0.805	0.808
Iran	0.836	0.801	0.758	0.745	0.797	0.809	0.811	0.814	0.825	0.837	0.810
Iraq	0.824	0.786	0.765	0.767	0.807	0.801	0.817	0.813	0.852	0.907	0.914
Venezuela	0.984	0.892	0.930	0.972	0.986	0.954	0.956	0.958	1.022	1.014	1.035

Source: Petroleum Press Service, September, 1971, p. 327.

favor.[7] 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),[8] the slow progress of local govern-
ment 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.[9]

New negotiations over the adjusted 1971 terms convened coinci-
dentally with the beginning of the Arab-Israeli War of 1973. The

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[7]Edith Penrose, "The Oil Crisis: In Perspective; The Develop-
ment of Crisis," Daedalus, Vol. CIV, No. 4 (Fall, 1975), p. 49.

[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)

Country	1970	1971	1972	1973	1974	1975
Saudi Arabia	$0.883	$1.259	$1.437	$1.567	$ 7.284	$ 9.948
Kuwait	0.828	1.203	1.360	1.706	7.462	10.027
Iran	0.862	1.246	1.358	2.080	8.719	10.137
Iraq	0.957	1.415	1.507	2.759	8.906	9.554
United Arab Emirates	0.920	1.272	1.434	1.619	9.166	9.967
Qatar	0.915	1.264	1.445	1.966	8.421	10.625
Libya	1.090	1.786	1.966	2.897	11.029	9.605
Algeria	0.907	1.268	1.877	2.426	10.482	10.196
Nigeria	1.093	1.722	1.870	2.997	11.069	10.563
Venezuela	1.092	1.411	1.719	2.330	8.709	9.610
Indonesia	0.693	1.040	1.243	2.568	8.707	10.606
Average all countries	$0.946	$ 1.353	$1.565	$2.265	$ 9.087	$10.085

Source: Petroleum Economist, March, 1975, p. 85, September 1976, p. 338.

TABLE 2-3

ESTIMATED GOVERNMENT OIL REVENUES
FOR THE MAIN OPEC MEMBERS
(million US Dollars)

Country	1970	1971	1972	1973	1974	1975
Saudi Arabia	$1,200	$ 2,149	$ 3,107	$4,340	$22,574	$25,676
Kuwait	895	1,400	1,657	1,900	7,000	7,500
Iran	1,136	1,944	2,380	4,100	17,500	18,500
Iraq	521	840	575	1,843	5,700	7,500
United Arab Emirates	233	431	551	900	5,536	6,000
Qatar	122	198	255	409	1,600	1,700
Libya	1,295	1,766	1,598	2,300	6,000	5,100
Algeria	325	350	700	900	3,700	3,375
Nigeria	411	915	1,174	2,200	8,900	6,570
Venezuela	1,406	1,702	1,948	2,670	8,700	7,525
Indonesia	185	284	429	950	3,300	3,850
Total	$7,729	$11,979	$14,374	$22,512	$90,510	$93,296

Source: Petroleum Economist, March, 1975, p. 85, September 1976, p. 338.

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 indicies to measure the purchasing power of OPEC revenue per barrel of oil vis-a-vis commodity exports from the U. S. to OPEC.[10] 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

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[10]Edward E. Murphy and Jorge F. Perez-Lopez, "Trends in U. S. Export Prices and OPEC Oil Prices," Monthly Labor Review, Vol. XCVIII, No. 11 (November, 1975), pp. 36-43.

FIGURE 2-1

PRICE INDICIES FOR U. S. COMMODITIES BOUGHT BY OPEC COUNTRIES
(1967 = 100)
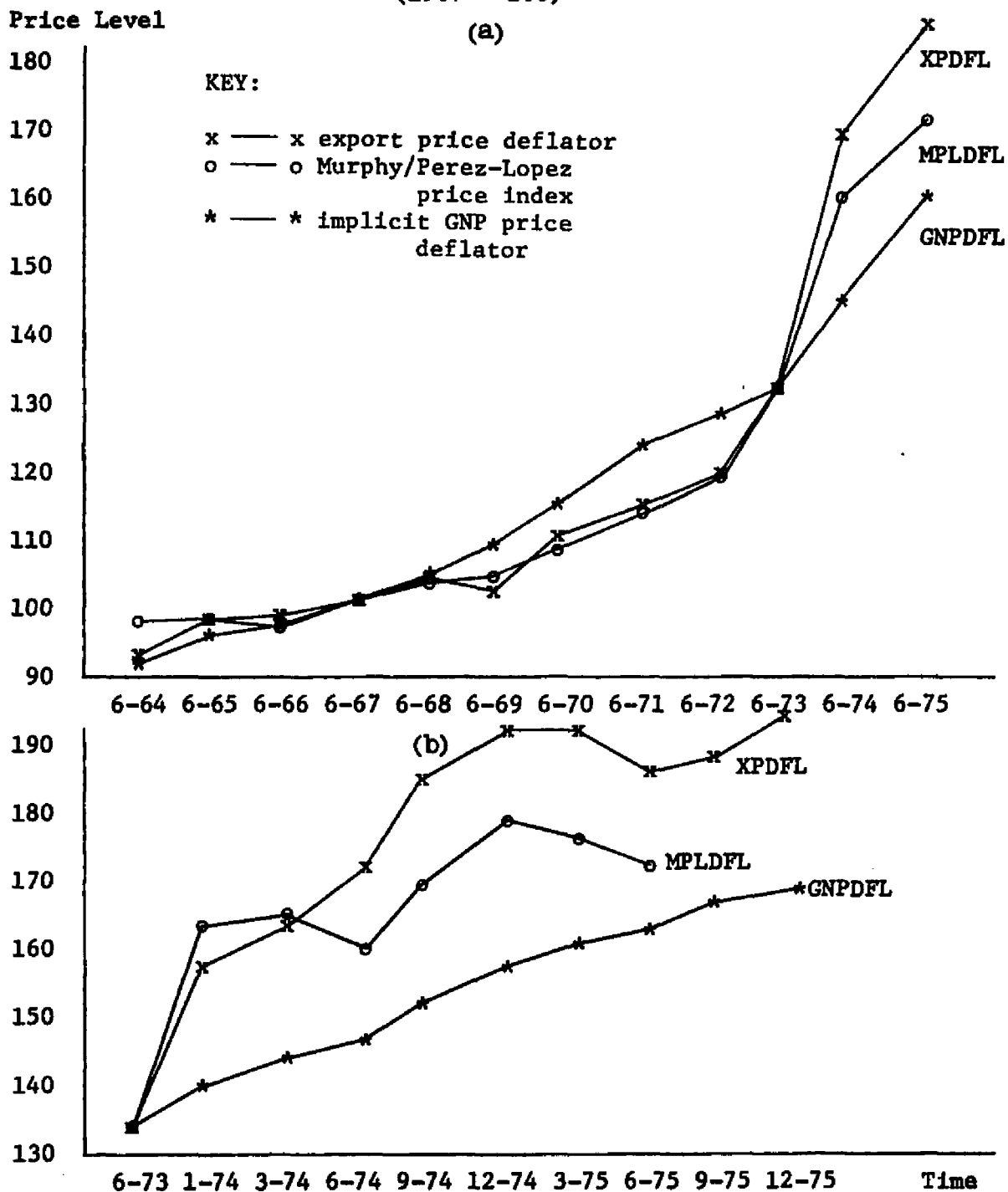
Source: Murphy and Perez-Lopez, "Trends in U. S. Export Prices and OPEC
Oil Prices," Monthly Labor Review, Vol. XCVIII, No. 11 (November,
1975), p. 37; U. S. Department of Commerce, Survey of Current
Business, January, 1976, part II, pp. 89-91 and January, 1977,
pp. 3 and S-2.

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.[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

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[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. (GNPDFL
in Figure 2-1) is close to the two export indicies 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 indicies, depicted
in Figure 2-1b with shorter time intervals than used in panel a,
indicate that the general indicies for dollar priced goods have
provided less accurate measures of the purchasing power of petro-
dollars 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.[12] 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

[12]Joel Darmstadter and Han H. Lansbert, "The Oil Crisis: In Perspective; The Economic Background," Daedalus, Vol. CIV, No. 4 (Fall, 1975), p. 22.

unity elsewhere.[13] 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.[14] 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.[15] In the U. S. the relative demand for oil

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[13]Joel Darmstadter and Sam H. Schurr, "The World Energy Out-
look To the Mid-1980's: The Effect of An Alternative Supply Path
in the U. S.," (an unpublished paper delivered at a meeting on
"Energy in the 1980's," at The Royal Society, London, November 15,
1973), p. 9 and table 9.

[14]James W. McKie, "The Oil Crisis: In Perspective; The
United States," Daedalus, Vol. CIV, No. 4 (Fall, 1975), p. 74.

[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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this industrial market by a strategy of price discrimination,
charging low prices on fuel oil (the main competition for coal)
and high prices on joint products like gasolines, which are not
subject to competition from coal. The European Governments com-
pounded the effects of this strategy by placing much higher taxes
on gasoline than on fuel oil.

[16]McKie, op. cit., pp. 74-76.

[17]Darmstadter and Landsbert, 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 acqui-
sitions), 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.[18] 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.[19] "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.[20] 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."

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

[20]Middle East Oil: A Study in Political and Economic Controversy (Vanderbilt University Press, 1970), pp. 422-423.

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.[21] 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.

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[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.

C.   Joint Consumer Country Response to OPEC

The major oil-importer countries had managed to weather

early oil emergencies with fair success.[22] 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

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[22]Joseph A. Yager and Eleanor B. Steinberg, Energy and
U. S. Foreign Policy (Cambridge, Mass.: Ballinger Publishing Co.,
1975), pp. 404-405.

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 Jaunary, 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 withhled 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

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[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 seven-

teenth 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

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[24]The 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.

The estimate of proved reserves in the British sector of the
North Sea is 10 billion barrels, in the Norwegian sector 4 billion
barrels with probable reserves of more than double that amount
existing in the drilling area below the 62nd parallel. Industry
forecasts put production rates at 2.3 MBD in the British sector by
1978. North Sea production of 0.25 MBD in 1975 and more thereafter,
has already made Norway a net oil-exporter. Organization for Economic
Cooperation and Development, Energy Prospects to 1985, Vol. I (Paris:
OECD, 1974), pp. 94, 98, and 101.

TABLE 2-4

COMPOSITION OF THE INTERNATIONAL ENERGY AGENCY

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

TABLE 2-4—CONTINUED

OECD Members[a] (24)	ECG Members (12)	IEA Members (19)	1976 Oil Consumption[d] Production (1000 m.t.)
Sweden		Sweden	14,788/3
Switzerland		Switzerland	4,911/0
Turkey		Turkey	13,487/2,595
United Kingdom[b]	United Kingdom	United Kingdom	97,784/11,765
United States	United States	United States	697,522/400,605

Sources: 1) The New York Times Index (annotated), for November 1-15, 1974 and February 1-15, 1975 (under OIL, International).

2) IEA, Oil Statistics 1976: Supply and Disposal (Paris, 1977).

3) Wall Street Journal, September 23, 1974 and May 26, 1976.

[a]Yugoslavia is a "special status" member of OECD.

[b]European Economic Community members.

[c]Associate members, meaning that they are not part of the IEA emergency sharing plan that is explained in Chapter Six.

[d]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)

Group	Oil Consumption (1000 m.t.)—% of World			Oil Production (1000 m.t.)—% of World		
IEA	1,542,267	—	52.3	513,960	—	17.1
OECD	1,710,884	—	58.0	533,412	—	17.8
Non-Communist World	2,400,000	—	81.4	2,370,000	—	79.3
Communist World[a]	550,000	—	18.6	620,000	—	20.7
World[b]	2,950,000	—	100%	2,990,000	—	100%

Sources: 1) Council on International Economic Policy, International Economic Report of the President, 1977.

2) IEA, Oil Statistics 1976: Supply and Disposal (Paris, 1977).

[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 pro-
grams 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 situa-
tion 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.[1] 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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[1]Lester G. Telser, *Competition, Collusion, and Game Theory* Chicago: Aldine-Atherton, 1972), p. 179.

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collapse can be percipitated 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 par-
ticular 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.[2] 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 com-
panies 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 exam-
ining some incentives for independent and for concordant pricing

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

[3]One 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 enter-
prises. 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. Con-
versely, 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 pre-
vailing 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 spend-
ing 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 responsibile
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]

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[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 enegry 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.[7] 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 pro-
ducer 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 expec-
ted 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 con-
vert 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:[8]

$$P_o^c = C_o + (B - C)_t (1 + r)^{-1}$$

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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[8]An equivalent equation for the complete marginal cost
associated with current petroleum production is derived by Dwight
R. Lee in "Pricing of Oil and the Immediacy of the Future," The
Journal of Energy and Development, Vol. I, No. 2 (Spring, 1976),
p. 295.

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_o 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_o 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

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[9]M. A. Adelman, "The World Oil Cartel: Scarcity, Economics, and Politics," Quarterly Review of Economics and Business, Vol. XVI, No. 2 (Summer, 1976), pp. 8-11.

$$P_o^c = \$0.25 + (\$13.50)_{2000} (1 + 0.1)^{-25} = \$1.50.$$

[10]William D. Nordhaus, "The Allocation of Energy Resources," Brookings Papers on Economic Activity, No. 3 (1973), pp. 553-57. Using his lower bound:

$$P_o^c = \$0.06 + (\$7.60)_{2010} (1 + 0.1)^{-40}$$ plus approximately $1.00 per barrel in transportation cost from the Middle East to the U. S. mid-continent = $1.20.

opportunity cost component, $[(B - C)^t / (1 + r)^i]$, of the P_o^c 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.[11] 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.

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[11]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_o^c 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.

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[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

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[13]Op. Cit., p. 8.

such is a reasonable estimate of the social productivity of invest-
ment."[14] 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.[15] 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 $(B - C)_t$

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

[15]If the marginal lifting cost (C) for crude oil were zero
[i.e., if B_t equaled $(B - C)_t$], the two rates would be equal.
Relative to B_t, C is minute for the Middle East. Therefore, to focus
on other reasons for differences between these two rates, the assump-
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.[16] 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 $P_o^{c'}$ is less than estimated P_o^c).

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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[16]William J. Baumol, _Economic Theory and Operations Analysis,_ (Second ed.; Englewood Cliffs: Prentice-Hall, 1965), pp. 454-55. That is, r' exceeds r because the return on future oil sales is less certain than the return on alternative investments.

foreign exchange on domestic projects.[17] 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.

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[17]Members of OPEC that are usually put into this category include Saudi Arabia, Kuwait, Qatar, Libya, the United Arab Emirates (U.A.E.). See H. B. Chenery, "Restructuring the World Economy," Foreign Affairs, Vol. LIII, No. 2 (January, 1975), pp. 242-63 or C. A. Gebelein, "Effects of Conservation on Oil Prices: Analysis of Misconceptions," The Journal of Energy and Development, Vol. I, No. 1, (Autumn, 1975), pp. 53-68.

If the risk associated with the external placement of margi-
nal 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 $P_o^{C'}$ greater than P_o^C as calculated by Pro-
fessors 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 calcu-
lations, 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
$P_o^{C'}$ 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 produc-
tion capacity in place in most of the OPEC nations. The cost to these
producers of increasing production therefore involves no added explora-
tion and development costs. Thus, since the cost of increased output
is just what is estimated above, the excess capacity evidence indi-
cates 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_o^c 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 (Σmc) for the group by aggregating the individual member marginal costs.[18] 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

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[18]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
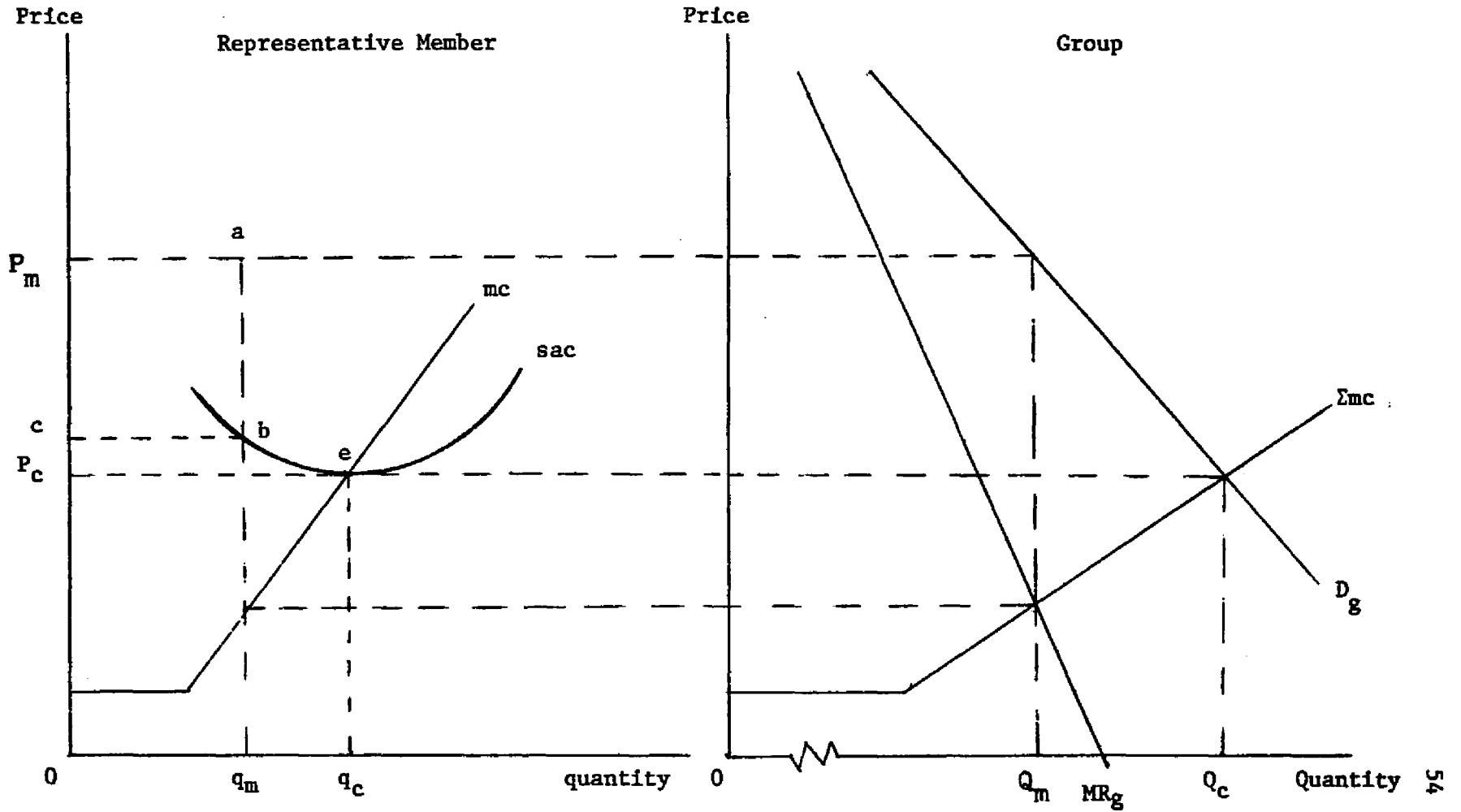
in the market. To maximize cartel profit, the central agency should
minimize cost by assigning each member an output quota like q_m.
Assume for the purposes of this section that the cartel can enforce
the quotas that it decides to assign.

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.[19] 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.[20]
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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[19]In Figure 3-1 for instance, the normal profit component of
$P_c eq_c^0$ must be smaller than the normal profit component of cbq_m^0
plus $P_m abc$.

[20]Because 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

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[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]This possibility may be a significant omission in the dynamic analysis of cartel pricing behavior done by S. W. Salant. "Exhaustible Resources and Industrial Structure: A Nash-Cournot Approach to the World Oil Market," Journal of Political Economy, Vol. LXXXIV, No. 5 (October, 1976), pp. 1079-93.

FIGURE 3-2

LIMIT PRICING WITH A COST ADVANTAGE OVER ENTRANTS
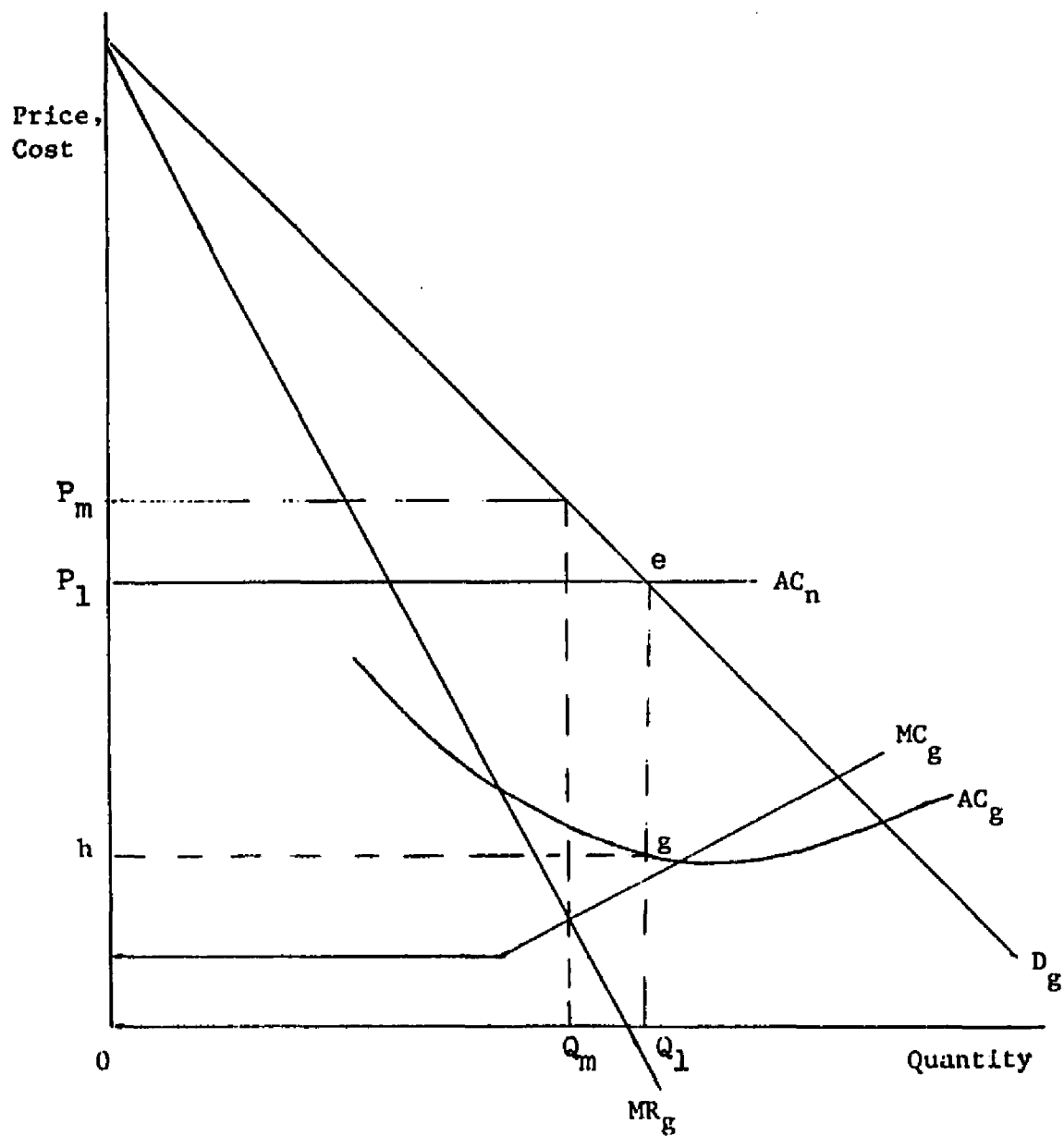
so that it can serve as a long run demand curve.[24] Since D_g is derived from this industry demand curve, it too can be viewed as a long run demand curve.

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.

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[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 D_g will not remain stable, but will shift to the left and continue shifting to the left as long as price is kept above AC_n. 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 $P_1 egh$ (less than $\frac{N}{\Sigma P_m} abc$ 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
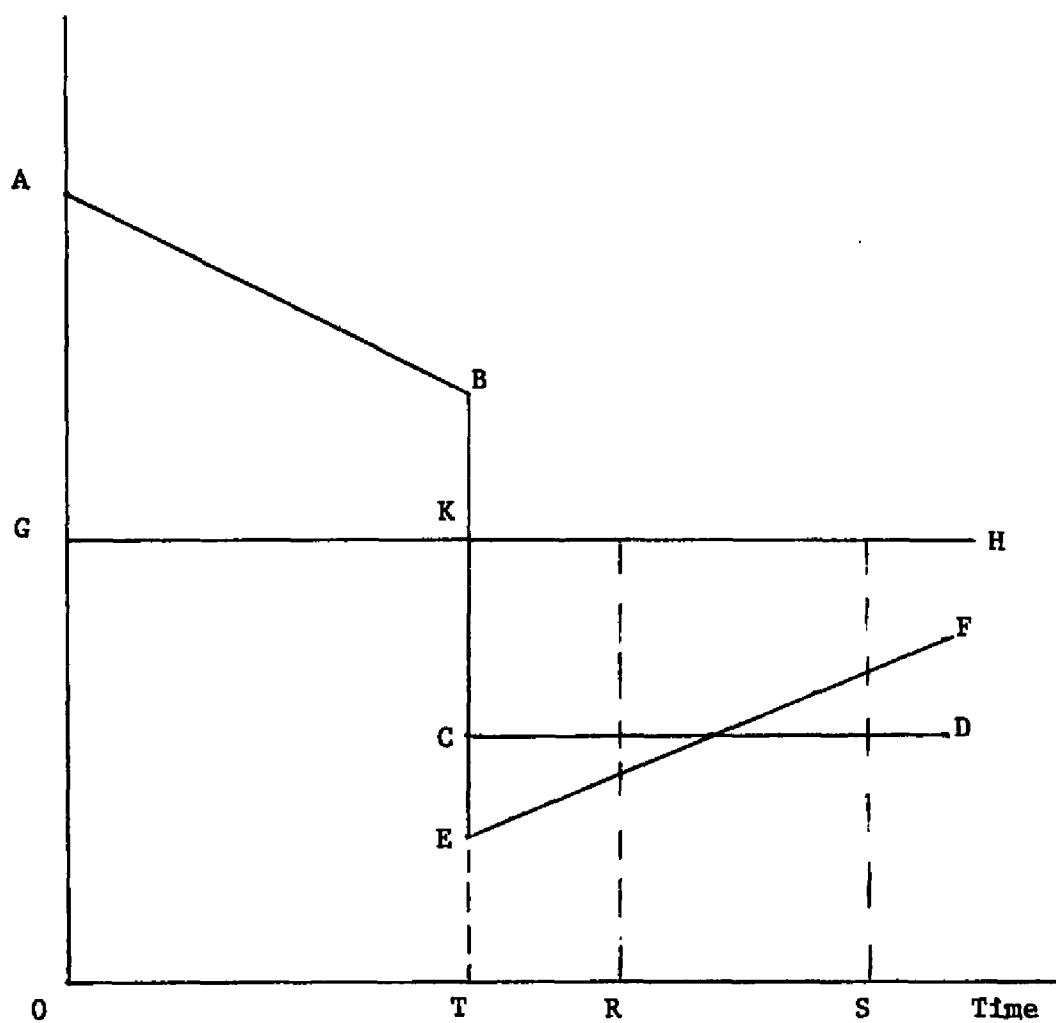
which shows the collusive firms' (undiscounted) profit stream over time.[25]

If P_m 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.

[25]This figure is adapted from one used by John T. Wenders in "Collusion and Entry," Journal of Political Economy, Vol. LXXIX, No. 6, (November-December, 1971), p. 1260.

[26]Both Scherer and Bhagwati, op. cits., 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 accomodate 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 $\Sigma P_m^N abc$ relative to $P_1 egh$ (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

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[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 = 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 con- venience 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,[28] 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.[29] 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 pro-

ducer 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

[28]The 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.

[29]Barriers to New Competition, (Cambridge: Harvard Univer-
sity Press, 1956), pp. 21-22.

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_1egh.

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 n = 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:

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

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

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

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

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

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

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 $\overset{N}{\Sigma}q_k = Q_k$ on D_g for an N member cartel.[30] 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, op. cit., p. 223.

FIGURE 3-4

THE DILEMMA OF A CARTEL
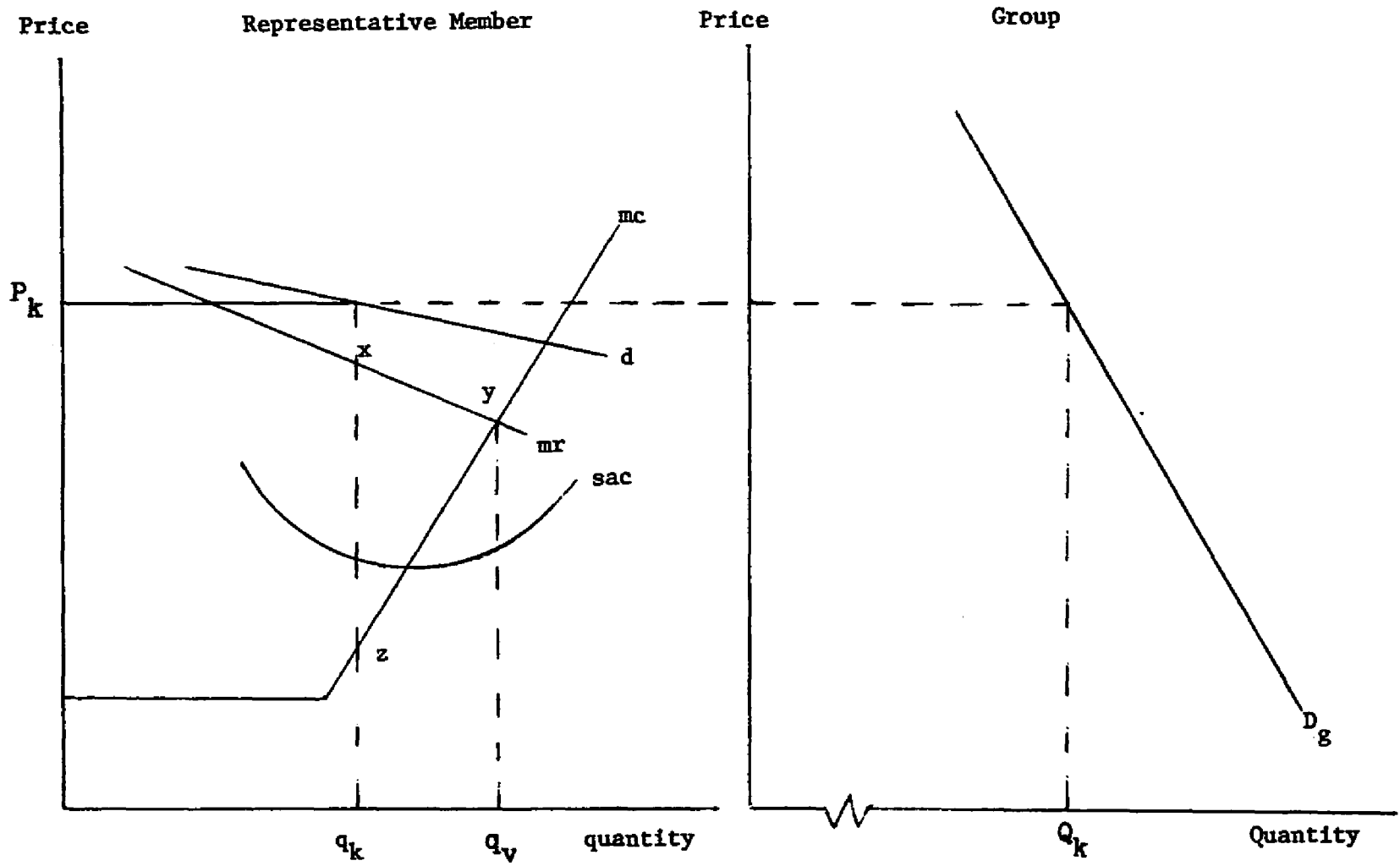
by the price hike is relatively small. In such a situation, the individual members do not have much extra capacity to employ in an attempt to enhance their profits in the short run. The revenue increase generated by the price rise, however, can provide internal financing for an expansion of production 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.[31] 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,

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[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.[32] 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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[32]D. 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.[33] 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.[34] 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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[33]G. Warren Nutter, "Duopoly, Oligopoly, and Emerging Competition," Readings in Microeconomics, ed. William Breit and Harold M. Hochman (New York: Holt, Rinehart and Winston, Inc. 1968) especially pp. 288-89.

[34]G. Warren Nutter and John H. Moore, "A Theory of Competition," The Journal of Law and Economics, Vol. XIX, No. 1 (April, 1976), pp. 39-65.

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 pro-
duction 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.[35] 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

[35]See, for instance, Central Intelligence Agency, The Inter-
national Energy Situation: Outlook to 1985, U.S. Government
Printing Office, stock number 041-015-00084-5, April, 1977.

TABLE 3-2

EXCESS CAPACITY BURDEN ON OPEC PRODUCERS

Country	Capacity (MBD)[a]		Production (MBD)		Excess Capacity (%)	
	Dec. 1975	Dec. 1976	Ave. 1975[b]	Ave. 1976	1975	1976
Ecuador	0.25	0.225	0.160	0.187	36.0%	16.9%
Gabon	0.25	0.25	0.225	0.218	10.0	12.8
Indonesia	1.7	1.7	1.305	1.505	23.2	11.5
Nigeria	2.5	2.3	1.785	2.068	28.6	10.1
Venezuela	3.0	2.6	2.345	2.295	21.8	11.7
Iran	6.8	6.7	5.350	5.884	21.3	12.2
Algeria	1.0	1.0	0.960	0.990	4.0	1.0
Libya	2.5	2.5	1.480	1.947	40.8	22.1
Iraq	3.0	3.0	2.260	2.090	24.7	30.3
Kuwait	3.5	3.5	2.085	2.151	40.4	38.5
Qatar	0.7	0.7	0.440	0.486	37.1	30.6

TABLE 3-2 CONTINUED

Country	Capacity (MBD)[a]		Production (MBD)		Excess Capacity (%)	
	Dec. 1975	Dec. 1976	Ave. 1975[b]	Ave. 1976	1975	1976
United Arab Emirates	2.34	2.38	1.665	1.941	28.8	18.4
Saudi Arabia	11.5	11.5	7.075	8.578	38.5	25.4
OPEC	39.04	38.355	27.135	30.340	30.5	20.9
Arab OPEC[c]	24.54	24.58	15.965	18.183	34.9 (23.0)[e]	26.0 (11.7)[e]
Persian Gulf Skeikdoms in OPEC[d]	18.04	18.08	11.265	13.156	37.6 (24.4)[e]	27.2 (15.2)[e]

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 3-3

CONCENTRATION RATIOS IN THE WORLD OIL MARKET OF THE MID 1970's

Market/ Measure	OPEC	Arab Subset of OPEC (7)[a]	4 Largest in OPEC[b]	Persian Gulf Nations[c]	Saudi Arabia
1. In World					
Production[e]	53 8	31.4	34.3	36.9	14.4
Reserves[f]	68.0	50.8	49.7	54.8	23.4
2. In Free World					
Exports[d]	91.7	54.3	59.4	62.7	24.3
Production[e]	65.6	38.3	41.7	44.9	17.5
Reserves[f]	80.9	60.4	59.1	65.1	27.9
3. Within OPEC					
Exports[d]	100	59.2	64.8	68.3	26.6
Production[e]	100	58.4	63.7	68.6	26.7
Reserves[f]	100	74.7	73.1	80.5	34.5

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.[36] 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.[37] 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.

[37]Paul Leo Ekbo, "OPEC and the Experience of Previous International Commodity Cartels" (Massachusetts Institute of Technology, Energy Laboratory Working Paper, No. 75-008WP, August, 1975), pp. 25-26.

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.[38] One, crude oil or petroleum products cannot be recovered

from scrap and recycled, so refiners are proportionately more depen-

dent 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 agri-

cultural commodities or manufactured goods, crude oil not produced

[38]Iam Smart, "The Oil Crisis: In Perspective; Uniqueness and Generality," Daedalus, Vol. CIV, No. 4 (Fall, 1975), pp. 267-70.

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.[39] 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).[40] 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 trans-

port cost when Alaska is added.[41] 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.[42] 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 esti-

mates that uranium fuel for electricity generation is available at

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[40]Exxon Public Affairs Department, Middle East Oil (New York: Exxon Corp., 1976), p. 15 and Joseph A. Yager and Eleanor B. Steinberg, Energy and U. S. Foreign Policy (Cambridge, Mass.: Ballinger Publishing Co., 1975), p. 238, or Jacques Cremer and Martin L. Weitzman, "OPEC and the Monopoly Price of World Oil" (Massachusetts Institute of Technology, Energy Laboratory Working Paper, No. MIT-EL-76-015WP, April, 1976), Appendix.

[41]U. S. Congress, Senate, Committee on Interior and Insular Affairs, Estimates of the Economic Cost of Producing Crude Oil, 84th Cong., 2nd Sess., 1976.

[42]"Shale Closest Among Liquid Synfuels," op. cit.

a per barrel equivalent cost of $5 to $7.[43] 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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[43]Hendrik S. Houthakker, The World Price of Oil: A Medium-Term Analysis (Washington, D.C.: American Enterprise Institute of Public Policy Research, October, 1976), p. 37.

[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, Profes-

sor 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 pro-

duction 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 divi-

dends 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 com-

petition it will cut the cartel price to a point below the cost of

production by the competition. Members can profitably maintain

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[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,[46] 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 presistent 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.

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[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 rela-
tive 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

Country	(Reserve/Production)[a]	Average Annual Oil (Revenue/Population)[b]
Saudi Arabia	49	$3,926
Kuwait	89	$7,397
U. A. E.	49	$26,218
Qatar	34	$18,333
Libya	43	$2,327
Iraq	46	$606
Iran	31	$524
Algeria	21	$230
Nigeria	19	$125
Venezuela	18	$644
Indonesia	26	$26

Source: The reserve/production ratio is calculated from data reported in the Oil and Gas Journal, December 29, 1975 and December 27, 1976. The per capita revenue figure is calculated by dividing the numbers in Table 1-3 by population estimates from U. S. Bureau of Census, World Population: 1975: Recent Demographic Estimates for the Countries and Regions of the World (Washington U. S. Government Printing Office, August, 1976).

[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 considera-
tions (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 pro-
prietary change might be expected to have on the behavior of the
cartel, Chapter Four reviews the rationale and progress of nationa-
lization 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

95

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.[1] 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.

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[1]Producers 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)

Source-Type	8/31/70	2/15/71	1/20/72	1/1/73	8/1/73	10/16/73	1/1/74	11/1/74[c]	11/1/75	1/1/77
Persian Gulf										
Arab Light	$1.80	$2.18	$2.48	$2.59	$3.07	$5.12	$11.65	$11.25	$12.38	
								(10.46)	(11.51)	(12.08)
Iran Heavy	1.63	2.13	2.42	2.53	2.99	4.99	11.64	11.64	12.40	
								(10.48)	(11.53)	(12.49)
Abu Dhabi										
Murban	1.88	2.44	2.54	2.65	3.14	6.05	12.64	12.24	12.86	
								(10.87)	(11.96)	(12.51)
Kuwait	1.59	2.09	2.37	2.48	2.94	4.90	11.55	11.55	12.26	
								(10.37)	(11.40)	(12.37)
African										
Libya	2.18	2.55	3.67	3.78	4.58	8.93	15.77	15.77	16.06	
								(12.00)	(12.32)	(13.81)
Nigeria	2.17	2.42	3.45	3.56	4.29	8.31	14.69	14.69	13.07	
								(12.02)	(12.51)	(14.35)
Indonesia										
Sumatran Light	1.70	1.70	2.26	2.96	3.73	4.75	10.80	12.60		
									(12.80)	(12.80)

TABLE 4-1 CONTINUED

Source-Type	8/31/70	2/15/71	1/20/72	1/1/73	8/1/73	10/16/73	1/1/74	11/1/74[c]	11/1/75	1/1/77
Venezuela Oficina	2.34	2.34	2.79	3.09	4.62	5.45	14.88	14.88	14.74 (12.80)	(13.99)
United States East Texas Flat	NA	NA	3.60	3.60	3.85	4.20[a]	5.20[b]	8.46[d]	7.76[e]	NA

Source: Project Independence Blueprint, Final Task Force Report, Federal Energy Administration, Department of the Interior, November, 1974; and Petroleum Economist (various issues).

[a]Effective 11/1/73.

[b]Effective 2/1/74.

[c]State 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 pirce has no meaning so it is dropped.

[d]Composite of 60% old and 40% new oil at prices of $5.20 and $13.35 respectively.

[e]Composite 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.[4]

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

Edward E. Murphy and Jorge F. Perez-Lopez, "Trends in U. S. Export Prices and OPEC Oil Prices," Monthly Labor Review, Vol. XCVIII, No. 11 (November, 1965), pp. 39-40.

[4]The 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,[5] 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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[5]A 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.

TABLE 4-2

COMPOSITE PRICE OF ARABIAN LIGHT, 1975

Price Type	Portion of Total Oil to which Applicable	Addition to Composite Price Per Barrel
1) Direct State Sales at $10.46 per barrel	5%	$ 0.52
2) Buy-back sales at $10.46 per barrel	55%	5.75
3) royalty and tax at $9.69 per equity barrel	40%	3.88
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 take-
over of these operations, the local owners must assume at least the
variable portion of the costs involved in the production of their
crude oil.[6] Since total production costs are two per cent or less
of posted price, the size of this gain to the countries is more on
the order of five per cent of the posted price.

B. Primer on Nationalization

Even before the evolution of this pricing system and its
modest economic incentive for 100 per cent participation, the OPEC

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[6]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.

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 opera-
tions 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 opera-
tions established within the host country, two factors changed.[7]
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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[7] E. W. Erickson and Leonard Waverman, The Energy Question:
An International Failure of Policy, Vol. I (Buffalo: University
of Toronto Press, 1974), p. xxi.

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.[8] 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.[9]

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.

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[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.

[9]Zuhayr Mikdashi, "Cooperation Among Oil Exporting Countries With Special Reference To Arab Countries: A Political Economy Analysis," International Organization Vol. XXVIII, No. 1 (Winter, 1974), p. 12.

a. Takeover Preparation

Until native expertise is gained, the takeover of oil opera-
tions 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.[10] Domestic skills and con-
fidence 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.[11]

With time, and the demonstration effect of the value of
skills in production, transportation, and marketing that is pro-
vided 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.[12] Once armed with such

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[10]Multinational Corporations and the Politics of Dependence:
Copper in Chile. (Princeton: Princeton University Press, 1974),
pp. 165.

[11]Anthony Sampson, The Seven Sisters (New York: Viking
Press, Inc., 1975), p. 230.

[12]This value of producing country unity is pointed out by
Erickson and Waverman, 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.[13] 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.[14] By the late 1960's though, important members of OPEC had gained sufficient bargaining strength to begin a more

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[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

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[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,
Mass.: Ballinger Publishing Co., 1975), pp. 16, 30, 53-55, 74-76,
114 and 117; or the Petroleum Economist, Vols. XLII (1975), pp.
374-75, 449-50, and 452 and XLIII (1976), p. 6.

content) and to the heavy dependence of Europe on this source.
The closed Suez Canal made Persian Gulf crude more costly to trans-
port, 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 national-
izing the Mobil and Exxon shares and 60 per cent of the Royal
Dutch/Shell share. Subsequently the financial stake of the govern-
ment 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 compensa-
tion 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 Bahrian, 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 takoever 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.[16] 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

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[16]Wall Street Journal, December 20, 1976 and February 17,
1978.

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

[17]"Debts, Trade Deficit Forcing Mexico Into OPEC," Oil and Gas Journal, May 10, 1976, p. 33.

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 national-
ization 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 national-
ization 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.[18] 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
nations.

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,
Mass.: Ballinger Publishing Co., 1974), pp. 168-69. Sheik Yamani,
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.[19] Nationalization terms that award a former producing company preferential prices make it more in that company's interest to perserve a price structure that grants an input cost advantage over its major rivals.

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[19] Edward R. Fried, "World Market Trends and Bargaining Leverage," in Yager and Steinberg, op. cit., p. 268.

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.[20] 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 astronomi-
cal 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.[21]

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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[20]Testimoney reproduced in U. S. Congress, Senate, Multi-
national Hearings, 94th Congress, 1st session, 1975, part II,
p. 253.

[21]Fried, op. cit., pp. 13 and 269.

1970.[22] 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 "inde-

pendents" 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.[23] 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 com-
panies have caused considerable fluctuation in the production levels
of several contries. 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 pay 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.[1]

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

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[1]OPEC after nationalization is the most prominant 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

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[2]F. Machlup, The Economics of Sellers Competition, (Baltimore, The Johns Hopkins Press, 1952), pp. 480-90.

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

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[3]"An Economic Analysis of Government Ownership and Regulation," Public Choice, Vol. XIX (Fall, 1974), p. 8.

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

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[4]L. DeAlessi, "Managerial Tenure under Private and Government
Ownership in the Electric Power Industry," Journal of Political
Economy, Vol. LXXXII, No. 3 (May/June, 1974), p. 646.

[5]Bahgat Korany specifically cites Arab-Islamic societies as
nations in which this personalized policy-making is most often seen.
"Foreign-Policy Models and Their Empirical Relevance to Third-World
Actors: A Critique and an Alternative," International Social Science
Journal, Vol. XXVI, No. 1 (1974), pp. 88-89.

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.[6] 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.[7] 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

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[6]Roland McKean, "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 inter-
national distributions of power -- [which] are of greater
importance.[8]

An example of such a conflict between economic interests and national

interests cited for the U. S. is the prohibiting of American sub-

sidiaries from bidding on certain lucrative sales contracts with

the Soviet Union, Cuba, or China.[9] 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

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Organizations," World Politics, Vol. XXVII, No. 1 (October, 1974),
especially pp. 39-42 and the group of articles in International
Social Science Journal, Vol. XXVI, No. 1 (1974), on "Challenged
Paradigms in International Relations."

[8]Robert Gilpin, U. S. Power and the Multinational Corporation,
New York: Basic Books, 1975), p. 39.

[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,

[10]F. Machlup, "Theories of the Firm: Marginalist, Behavioral, Managerial," American Economic Review, Vol. LXVII, No. 1 (March, 1967), p. 1-33.

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.[11] 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.

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[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 pro-
ducers 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 pre-
ferences 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 multi-
national companies by the local government.[12] 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.[13] Savings do not have to
be generated through high levels of internal deprivation. Foreign
investment (particularly in the form of a near autonomous multi-
national 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.

[13]Robert T. Heilbroner, The Making of Economic Society (5th
Ed.; Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1975), pp. 248-49.

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.

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[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 then 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.[15] 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.[16]

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

[15]Op. cit., pp. 44-46.

[16]Ibid., p. 45.

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.

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[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 certainly 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

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[18]_Op. cit._, pp. 1078-1080.

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 dis-
regard 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 zenophobic feelings, may lead these
officials to sabotage some efforts at international cooperation.
Individual philosophical differences can make effective communica-
tion 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]

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[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.[20] 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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by D. K. Osborne, "Cartel Problems," American Economic Review, Vol. LXVI, No. 5 (December, 1976), pp. 838-39.

[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.[21] 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.[22] He estimates that even by 1980,

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[21]Supra, p. 106.

[22]"Effects of Conservation on Oil Prices: Analysis of Misconceptions," The Journal of Energy and Development, Vol. I, No. 1 (Autumn, 1975), pp. 53-68. Constantine Fliakos and Ronald D. Lewison make the same assertion on p. 73 of the same journal in

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

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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.

[23]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.[24] 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 spend-
ing 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 severaly 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 psychological 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

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[25]_Op. cit._, pp. 34 to 36.

(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,

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[26]Ibid., 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 D_g 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 D_e 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 P_1,

FIGURE 5-1

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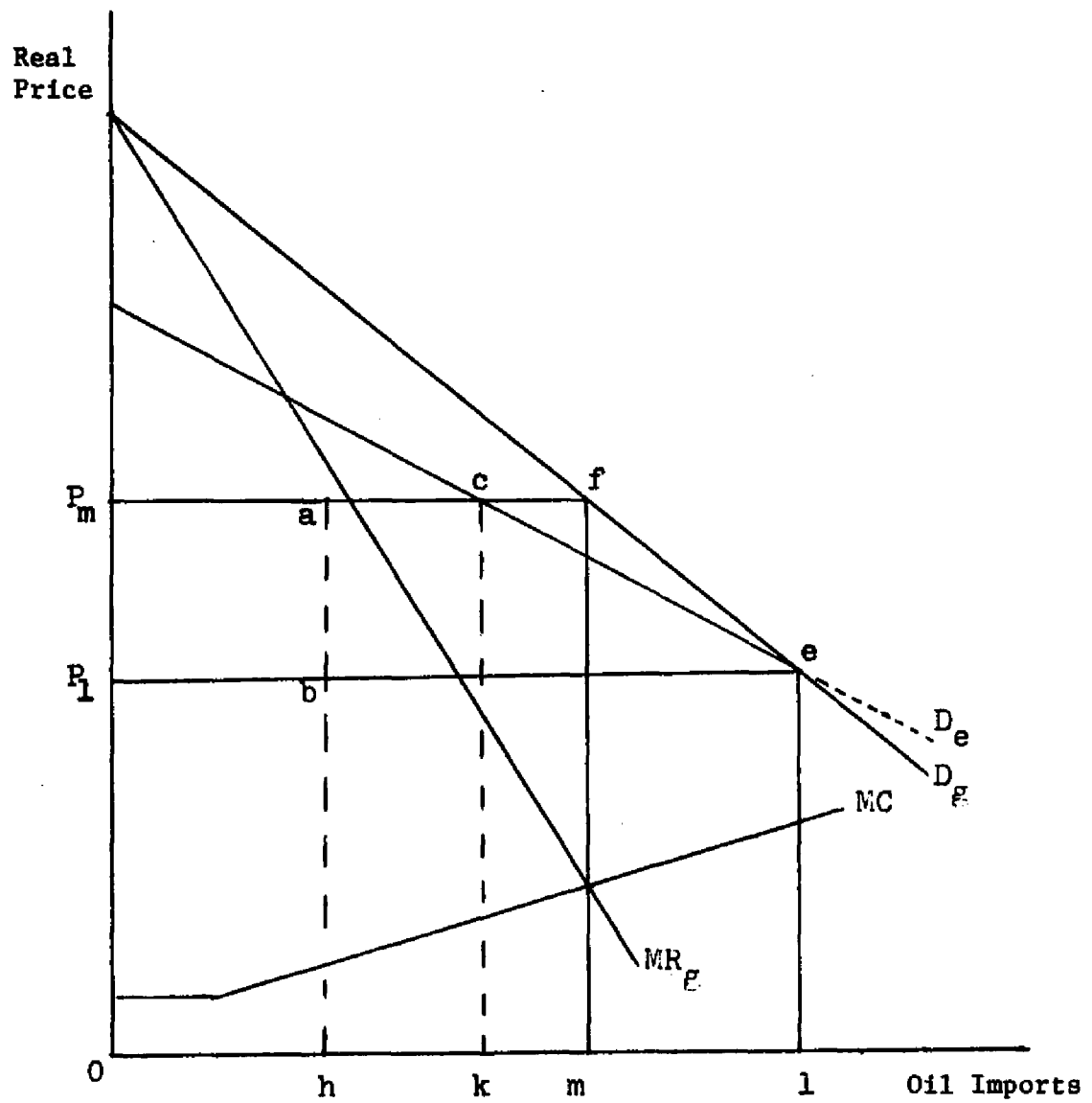
entry will not occur, so D_e and D_g coincide at and below that price. The further above P_1 price is at first set, the more entry by non-cartel sources should occur. Thus, D_e should be more elastic above P_1 than D_g.

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, Oh, per period and receive revenue of $P_m$ahO, and LA would provide whatever else the market will absorb at P_m (hm with a revenue of afmh before entry). Assume that while member production capacity remains as described by MC, entry reduces the sales of the group to Ok 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 hk and revenue to ackh. 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 (km) 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 Oh) and and entry alteration of cartel outoup (km) would have to exceed the size of the expansion of the quantity demanded from the cartel at P_m (Om).

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.[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 transfering 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)

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[27]"The World Oil Cartel: Scarcity, Economics, and Politics," Quarterly Review of Economics and Business, Vol. XVI, No. 2 (Summer, 1976), p. 14.

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. Some-
thing 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.

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[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 inadverently 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,[30] 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"[31] 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

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[32] Boris C. Swerling points out that the longest lived ICA's have required consumer country support, or at least not unified opposition. "Commodity Agreements, International," International Encyclopedia of the Social Science, Vol. III (1968), p. 19.

[33] Waters, op. cit., pp. 748-86.

subsidization can lock the LDC into production of that one com-
modity, 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 restric-
tions, may assist industrial countries in controlling their own
inflation.[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.

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[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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[35]Zuhary Mikashi, "Cooperation Among Oil Exporting Countries
With Special reference to Arab Countries: A Political Economy
Analysis," International Organization, Vol. XXVIII, No. 1 (Winter,
1974), p. 13.

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.[36] 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 capacility could just

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[36]U. S. Congress, Senate, Multinationals Subcommittee of the Foreign Relations Committee, Multinational Hearings, 94th Congress, 1st session, 1975, part 11, p. 6.

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 irreconciable
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

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[37] Jacob Viner, "International Relations Between State-Controlled National Economies," Readings in the Theory of International Trade (Homewood, Ill.: Irwin, Inc., 1950), p. 441.

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 relin-
quish sovereign authority over operations carried out by their
own government to an organization like a PEC was developed
earlier.[38] Dispute settlement thus falls to ad hoc diplomacy,
where the possibility of resort to force in case of an unsatis-
factory 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 arbi-
trate 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.[39] 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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[39]Thomas D. Willett, "Oil Import Quotas Are Not the Answer," The Journal of Energy and Development, Vol. I, No. 2 (Spring, 1976), p. 244.

capabilities, the OPEC countries do not constitute a political com-

munity as does, say, Western Europe.[40] 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.[41] The pre-

sence 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 strenthening 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

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[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 subjuga-
tion 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 pre-

sented 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 analy-

sis 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.

[2]Several analyses of OPEC's future ignore or minimize the
possibility of an effect by consumer forces on price determination.
See, for example, Albert L. Danielsen, "Cartel Rivalry and the World
Price of Oil," Southern Economic Journal, Vol. XLII, No. 3 (January,
1976), pp. 407-15; Thomas D. Willett, "Oil Import Quotas Are Not the
Answer," The Journal of Energy and Development, Vol. I, No. 2
(Spring, 1976), pp. 240-48; and Ian Smart, "The Oil Crisis: In Per-
spective; Uniqueness and Generality," Daedalus, Vol. CIV, No. 4,
(Fall, 1975), pp. 259-80.

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.[3] 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.

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[3]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.

1. Supply Security Provisions

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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[4]The nations that have yet to ratify are Italy, Japan, and Turkey. U. S. Department of State, Treaties in Force: A List of Treaties and Other International Agreements of the U. S. in Force on January 1, 1976 (Washington, D.C.: U. S. Government Printing Office, 1976, p. 347, and the State Department Bulletin, various issues during 1976.

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.

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[5]"IEA Tests Emergency Oil Sharing System," The OECD Observer, No. 83 (September/October, 1976), pp. 10-11.

[6]"Antitrust Shield Mulled for IEP," Oil and Gas Journal, December 20, 1974, p. 97 and Douglas McCullough and W. E. Steger, "A National Program for Emergency Reserves of Petroleum," (an

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.

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unpublished draft summary of "A National Emergency Energy Program," Energy Policy Office, October 18, 1974), p. 5.

[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).[8] 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.

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[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.[9] 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.[10]

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,

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[9]Sections 101 and 201-203 of the Energy Policy Act.

[10]U. S. Department of State News Release, International Energy Program (Washington, D.C.: February, 1975).

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.[11] 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

[11]Section 251 (d) of the Energy Policy Act. Refusal to accept this provision before the oil crisis, blocked earlier international agreements on an emergency sharing system. Joseph A. Yager and Eleanor B. Steinberg (eds.), Energy and U. S. Foreign Policy (Cambridge: Ballinger Publishing Co., 1975), p. 405.

TABLE 6-1

APPROXIMATE RELATIVE OIL DEPENDENCE
WITHIN THE IEA (1975)

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

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

$(16 \times \frac{121}{1000 - 535} = 4.2$ 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 con-

sumption" 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 "per-

missible 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 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.[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.[13]

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[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 ...," 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," 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 auto-
matically renders an embargo directed at one (or a subgroup of
IEA members) an embargo against a prepared group of all seventeen.[14]
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.[15] 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 euphenism for LDC's] to place a premium on the psychic
rewards of seeing Europe and Japan in periods of panic which out-
weigh 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 Organiza-
tion, 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.[16] 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

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[16]"The OECD and Its International Energy Agency," _Daedalus_, Vol. CIV, No. 4 (Fall, 1975), p. 219-20.

one market by the IEA should prevent some of the uncertainty and
anxiety that surrounded the last embargo from worrying the govern-
ments 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 commit-
ments to the group.

The consultation provision seems to have been the major
requirement of several of the smaller countries for their parti-
cipation 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.[17] Further, the
Agreement legally commits the oil companies to follow a policy which
is coordinated with that of the various governments in an emergency.

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[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 feauture 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

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[18]Lantzke, op. cit., pp. 225-26.

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 alter-

native 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 con-

servation 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

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[19]"IEA Adopts a Long Term Energy Cooperation Programme,"
The OECD Observer, January-February, 1976, p. 32.

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.[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

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[20]Organization for Economic Cooperation and Development, Energy Prospects to 1985, Vol. I (Paris: OECD, 1974), pp. 24-25.

pressure on OPEC.[21] 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.[22] 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 situ-

ation, 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.[23]

The more recent worry with energy conservation efforts

seems to be that interest in eliminating waste may fade.[24] Some

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[21]Supra, p. 145.

[22]"IEA Adopts ...," op. cit., p. 32.

[23]Section 301 of the Energy Policy Act requires that the fleets that domestic automobile makers and importers sell average 18 mpg in 1978, 19 mpg in 1979, and 20 mpg in 1980, and 27.5 mpg in 1985.

[24]"Conservation of Energy: How Are Countries Performing?" The OECD Observer, No. 83, (September/October, 1976), pp. 4-9.

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.[25] 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.[26] To the extent that Norway's
refusal to join inhibits the development of its offshore reserves,

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[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.[27] How-
ever, 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 Kindgom 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

become observation posts for other Western nations. The New York
Times, September 11, 1974, and November 1, 1974.

[27]"IEA Foundering on National Interest," Oil and Gas
Journal, January 5, 1976, p. 57; and "Drilling Delay Likely for
New U. K. Blocks" Oil and Gas Journal, March 7, 1977, p. 83.

U.S.[28] 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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[28]"IEA Head: U. S. Key to Energy Economy," Oil and Gas Journal, April 18, 1977, pp. 24-25; and "Reducing OECD Countries' Dependence on Imported Oil," The OECD Observer, No. 80 (March/April, 1976), p. 29.

sixteen specific areas.[29] 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

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[29]For a summary of progress in those areas as of the end of 1975 see The International Energy Agency With Special Emphasis on the Subgroup on Energy Conservation Working Party, Division of Buildings and Inudstry, Office of Conservation, Energy Research and Development Administration, December, 1975.

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 diversifica-
tion 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 quan-
tity 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

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[30]U. 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.[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 CMSP 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:

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[31]David B. Johnson, "Analysis of the Common Minimum Safeguard Price and Policy Elaboration" (preliminary draft of an unpublished paper, April 22, 1975), p. 1.

> 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. Forbidance of permission to set

a price floor is probably aimed more at preventing U. S. parti-

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.

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[32]Section 402.

[33]Arthur 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 develop-
ment of specific kinds of technology -- the U. S. in solar and
nuclear energy production, the Europeans in the field of coal
gasification and liquification, the Scandinavians in the field
of home insulation, and the Japanese in the field of cleaning
stack emissions of coal burning electricity generation.[34] The
lead country in the cooperative efforts apparently takes over
responsibility for further efforts under joint government auspicies

[34]Cooperative Approaches to World Energy Problems (Washing-
ton, D.C.: Brookings Institution, 1974), p. 36.

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.[35] 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.

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[35]F. M. Scherer, Industrial Market Structure and Economic Performance (Chicago: Rand McNally, 1971), pp. 380-82.

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, if is far from certain all
will be tried. Aggregate conservation potential in 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 in danger of institutionalizing
the current high level of relative energy prices and/or of violating
porprietary reasons for allowing the market to distribute innova-
tions. The distinct possibility exists that the CMSP will not be
adopted and that even it 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 ot 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 pro-

visions 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 prob-

lems 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

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[1]Several available studies offer brief discussion on how
overt importer pressure, say through the use of quotas, tariffs, or
changes in interest rates, may influence the oil income of the pro-
ducing governments. See, Hendrik S. Houthakker, The World Price of
Oil: A Medium-Term Analysis (Washington, D.C.: American Enterprise
Institute of Public Policy Research, October, 1976), pp. 29-34;
Richard Schmalensee, "Resource Exploitation Theory and the Behavior
of the Oil Cartel," European Economic Review, Vol. VII, No. 3 (April,
1976), pp. 271-73; or Giorgio Basevi and Alfred Steinberr, "The 1974
Increase in Oil Price: Optimum Tariff on Transfer Problem,"

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, im-
plies 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 member-
ship, 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.[2]

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 con-
cerning so vital a commodity as oil, or that such responses may
only serve to solidfy the OPEC group politically.

[2]For a contrary opinion, see Richard Kosobud, "An Inter-
national Oil Agreement Through Bilateral Bargaining," (an unpub-
lished paper received from the author in September, 1976).

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.[3] 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 bilateral monopoly bargaining with the seller group. Figure 7-1 can be used to depict the preferences of the two sides. Let MC_s represent the marginal cost curve for the seller group.[4] 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 Administration 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 successfully with oil producing nations. Two, there is a widespread conviction 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
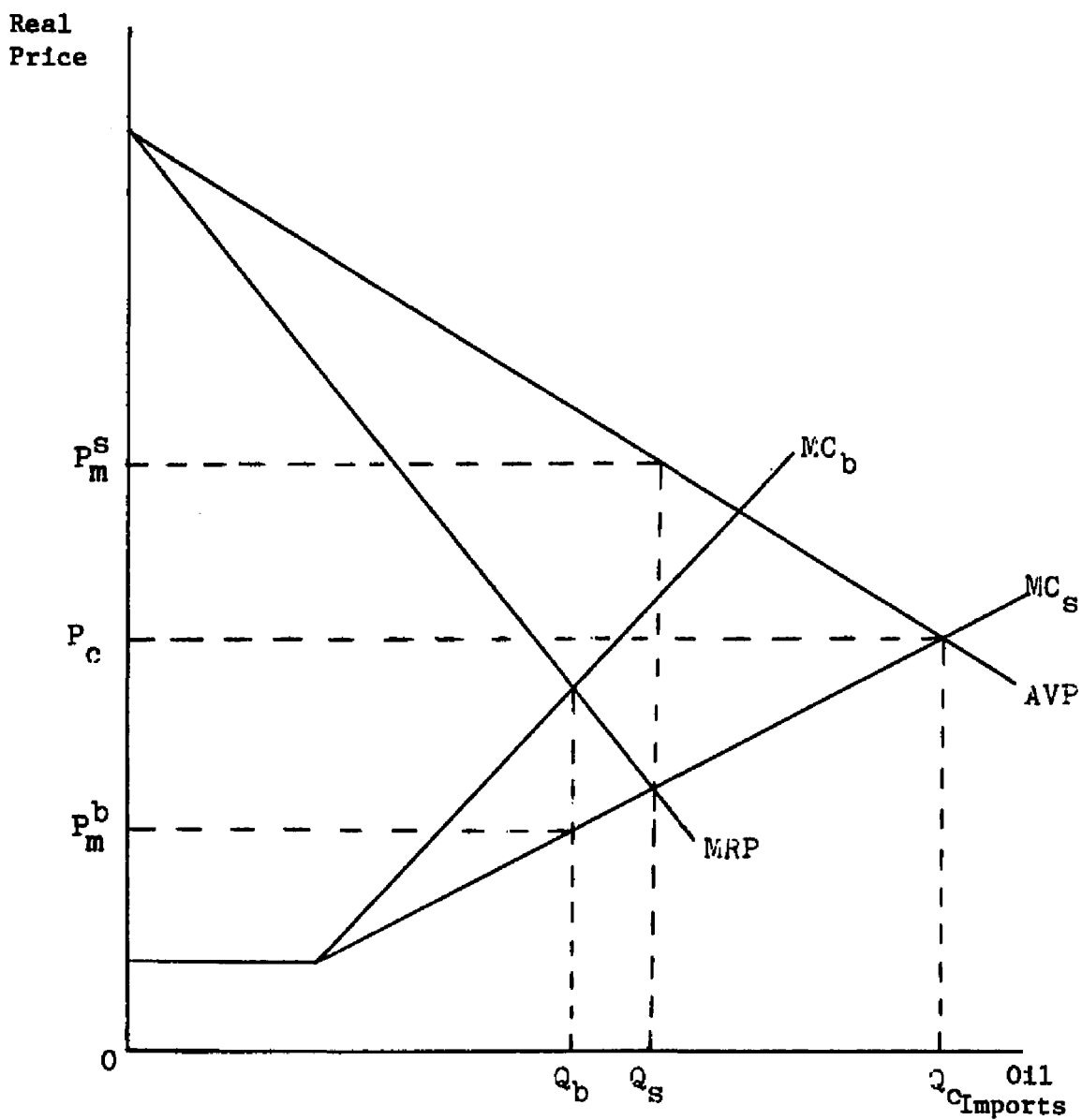
oil to the monopsonist is equal to the price at which it can be resold. The average value product curve (AVP) is then identical to the end product (oil imports) demand curve. Marginal to this curve is a marginal revenue product curve (MRP), which shows the revenue associated with buying and then reselling an extra unit of the commodity. The monopsonist would elect to operate at output Q_b and to pay the seller P_m^b if it were a profit maximizer, for there its marginal cost equals its marginal revenue.[5] 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_m^s 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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[5]This 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.
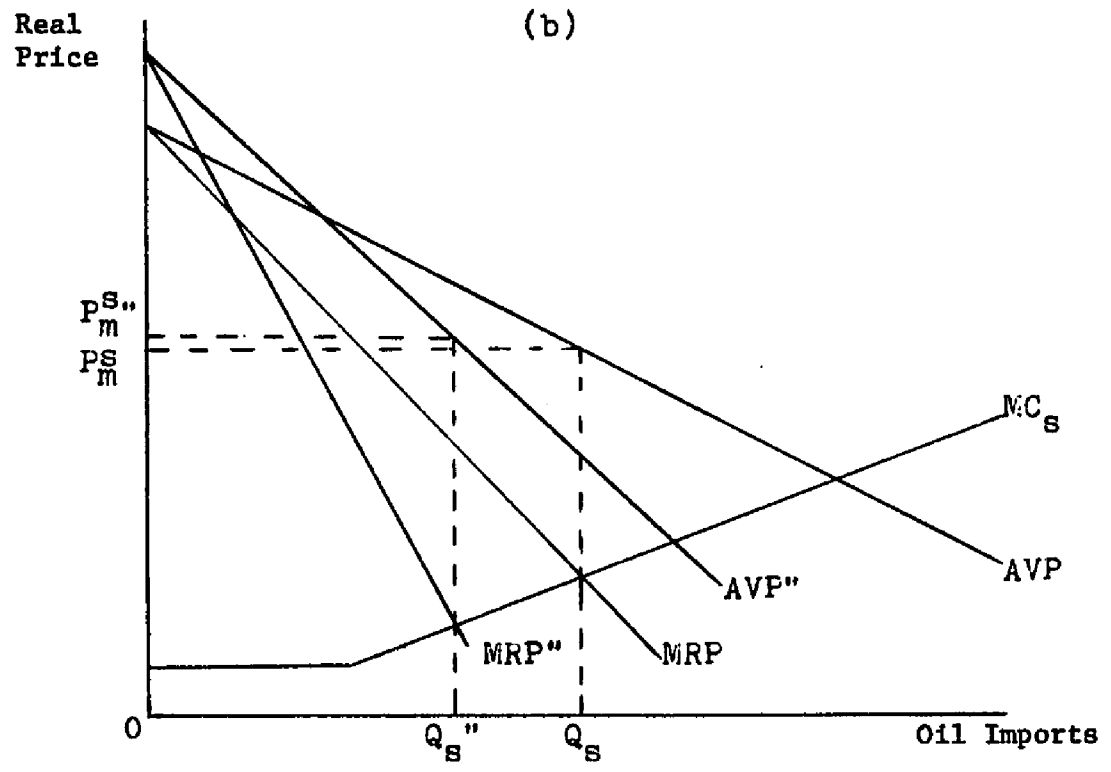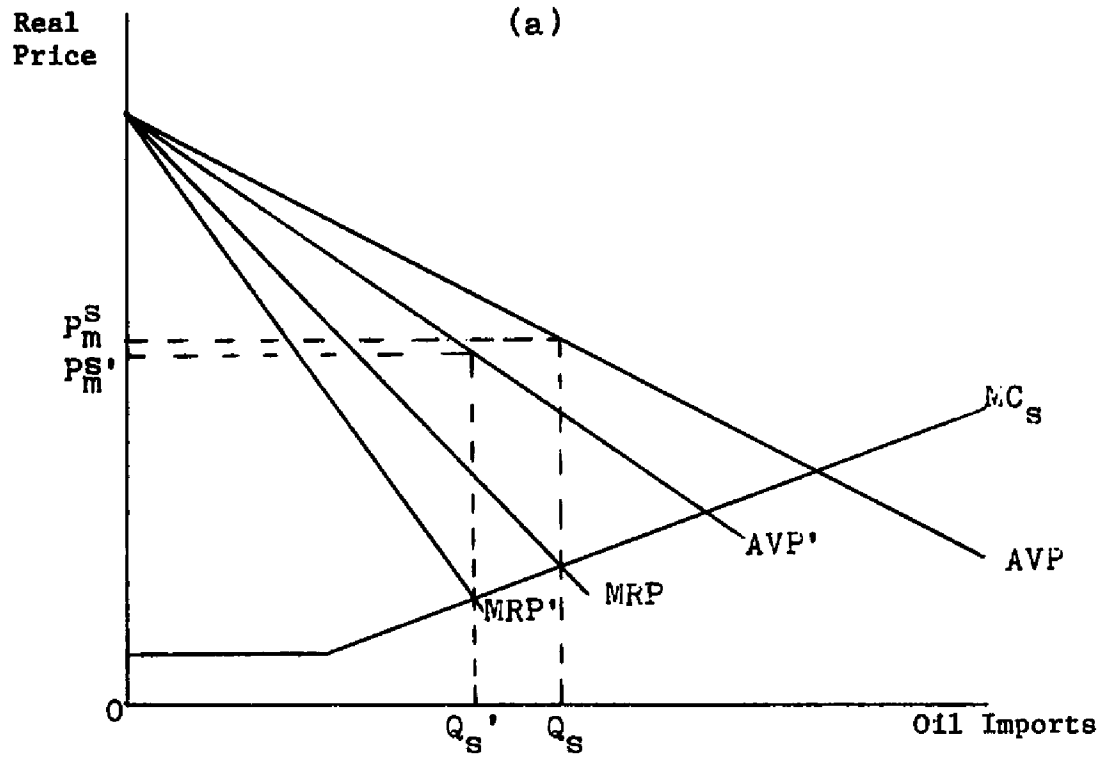
democratic governments in industrial nations to force constituents accustomed to an energy intensive life style to accept artificial shortages of oil in hopes of pressuring OPEC to reduce its prices is probably not very great.[6] Also, if this government buying operation follows the procedure of other public purchasing activities, winners and prices must be publicly announced.[7] 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^s to $P_m^{s'}$). 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 11.

[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)

Real
Price

P_m^S
$P_m^{S'}$

MC_s

AVP'

AVP

MRP' MRP

0   Q_s' Q_s Oil Imports

(b)

Real
Price

$P_m^{S''}$
P_m^S

MC_s

AVP

AVP''

MRP'' MRP

0   Q_s'' Q_s Oil Imports

result.[8] 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.[9] 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^s to $P_m^{s''}$) if the assumed 25 percent import reduction at the initial price results in a less elastic average value product (AVP") or demand curve.[10] 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_s 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.

[9]M. A. Adelman, Multinational Hearings, op. cit.

[10]Robinson, op. cit., p. 73, notes this possibility and Raymond Piccini, "On the Effect of Energy Conservation on OPEC Pricing," The Journal of Energy and Development, Vol. III, No. 1 (Autumn, 1977), pp. 190-192, applies it to OPEC.

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.[11] 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.

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[11]Kosobud, op. cit.

because of uncontrollable weather conditions.[12] 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,[14] 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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[14]T. D. Willett, "Oil Import Quotas Are Not the Answer," The Journal of Energy and Development, Vol. I, No. 2 (Spring, 1976), p. 244.

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 promi-
nent 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. Simu-
lations 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 sta-
bility.[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

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[15]Op. cit., p. 32.

further inflate fuel prices and require obvious sacrifice by consti-
tutents 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 antago-
nistic 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 involv-
ing 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

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[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.[17] 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 prorationing via an informal voluntary method is only able to achieve 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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[17]"Effects of Conservation on Oil Prices: Analysis of Misconceptions," The Journal of Energy and Development, Vol. I, No. 1 (Autumn, 1975), p. 67.

absolute minimum amount these countries should have to produce to fund feasible spending projects in 1980 out of current income.[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 activites 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

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[18]Ibid., p. 65 provides the first and last figures used in this example.

FIGURE 7-3

Impact of Displacement Efforts
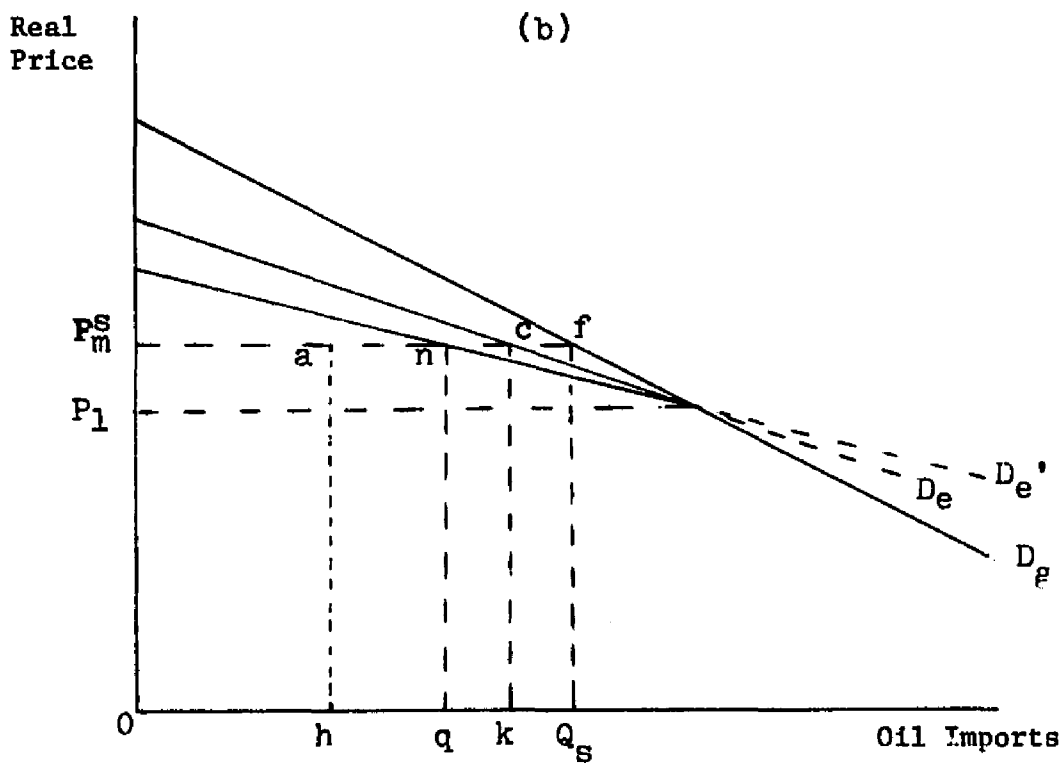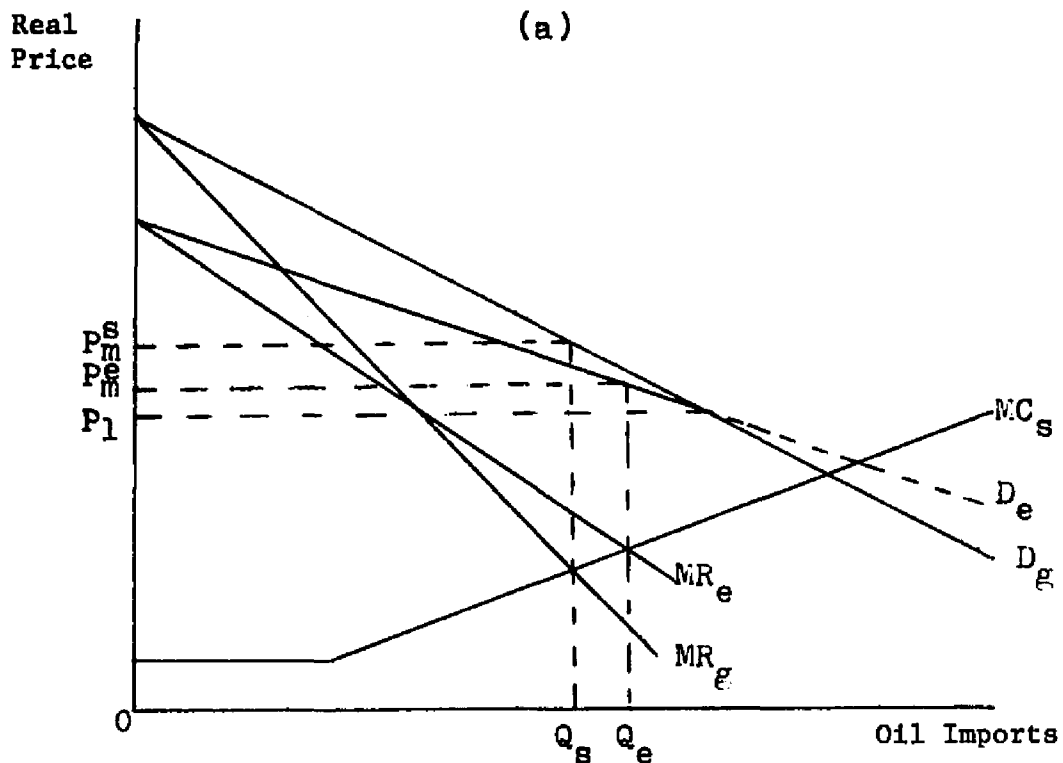
curve for the producer group occasioned by the entry of non-OPEC
sources into the energy market. The corresponding marginal revenue
curves are MR_g (equivalent to MRP in Figure 7-2) for D_g and MR_e
for D_e. Panel 7-3a demonstrates that the price preferred by the
monopolist falls from P_m^s to P_m^e 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 elas-
ticity of demand for oil imports beyond that due to the private
efforts elicited by a price above the limit price (P_1). This latter
effect is reflected by an additional rotation of the cartel's demand
curve through P_1 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^s is more likely to be reduced (to P_m^sck0 at 0k, 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 $P_m^a nq0$ at $0q$ and $anqh$ at 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_m^e 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_m^e) is of no benefit. Instead, their revenue actually falls with their stable output $0h$, while the residual producer receives the revenue associated with the extra sales of Q_g 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_g) for the seller group is found by the intersection of the MC_g 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_gh) and other producers ($P_m^a ah0$). 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 $P_m^{e''}$. Though aggregate

Figure 7-4

Combined Impacts of Displacement

and Conservation
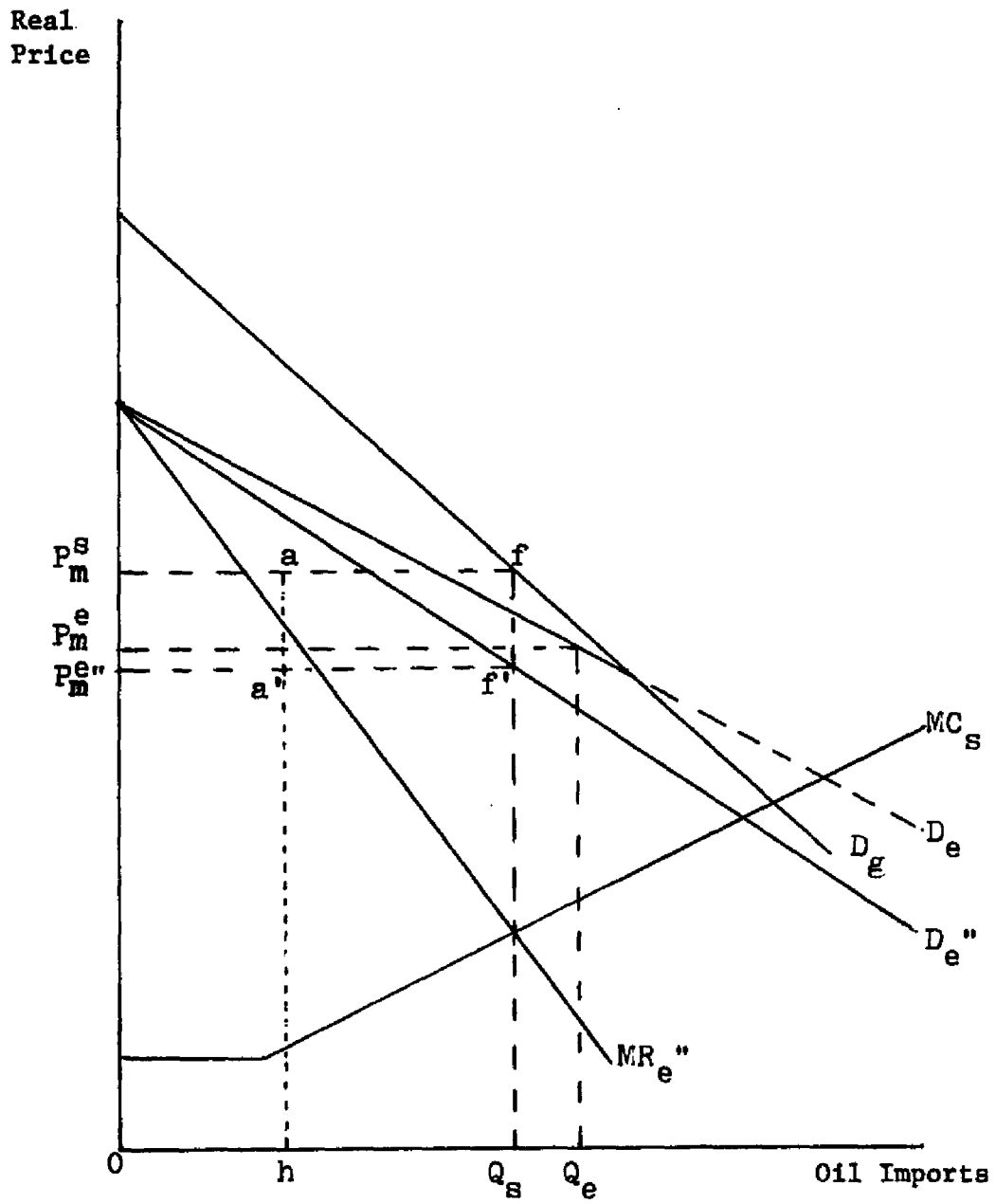
real revenue falls, the relative shares received by the firms or
subgroups comprising the cartel do not change. That is,
$P_m^{e}{''}a'h0/a'f'Q_s h$ equals $P_m^{s}ah0/afQ_s h$, so the political prerequisite
to stable but informal collaboration is preserved.

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 poten-
tial 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

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Figure 7-5

THE CMSP EFFECT

Figure 7-5. THE CMSP EFFECT
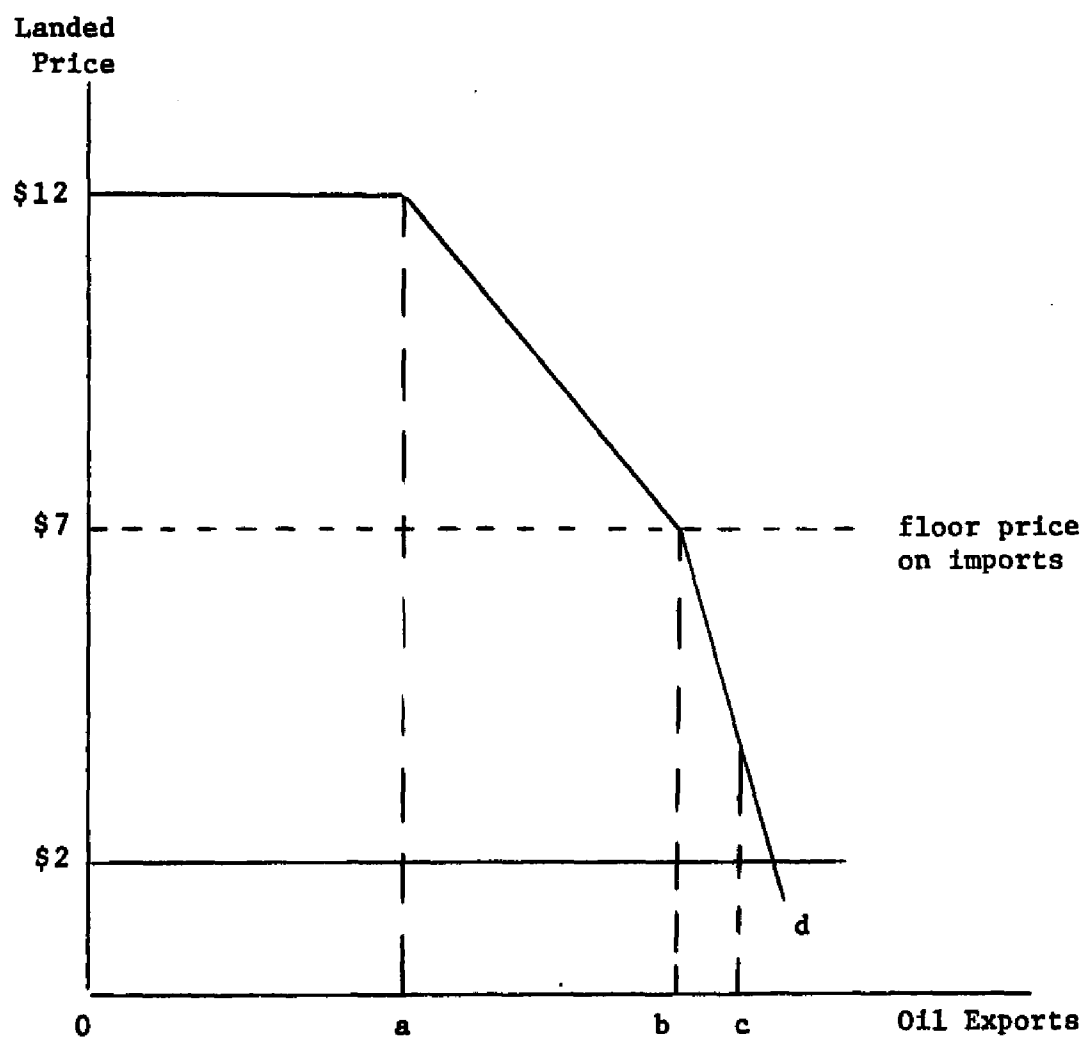
amount ab for two reasons. He gains sales at the expense of rivals and, to the extent that there is elasticity in the market demand, from the sales added to the market total. If many international oil companies are tied by long term purchase commitments to the crude oil of certain countries, most of 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 CMSP holds. Chiseling below this level will add to the sales of the price cutter only at the expense of displaced rivals (in the amount bc 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."[20] To the extent that a CMSP 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.

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[20]"Multiplant Firms, Cartels, and Imperfect Competition," Readings in Microeconomics, eds. William Breit and Harold M. Hochman, (New York: Holt, Rinehart and Winston, Inc., 1968), p. 308.

Since it has come to appear that OPEC will not soon collapse by itself, the CMSP 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 CMSP.

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 break-throughs 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 pro-ducing 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 success-
ful 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 under-
mines 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 diffi-
cult 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 substi-
tutes for oil imports can result in the monpolist 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.

CHAPTER EIGHT

CONCLUSIONS

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 grovernments, 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.

237

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 members 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 prorationing 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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243

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VITA

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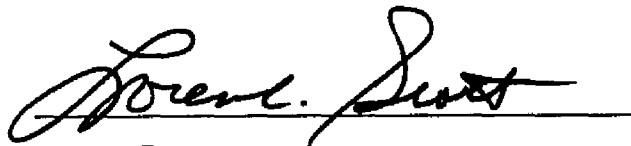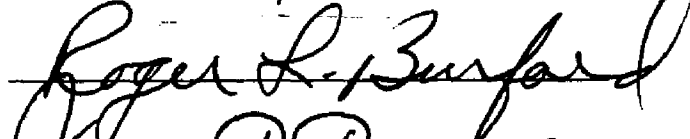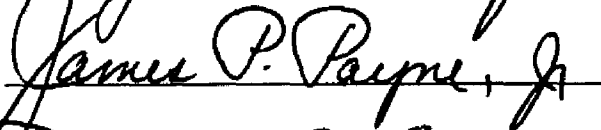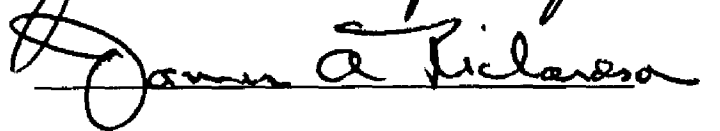
Major Field: Economics

Title of Thesis: Political Economic Cartels: An Alternative Approach
to the World Oil Market

Approved:

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Dean of the Graduate School

EXAMINING COMMITTEE:

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Date of Examination:

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July 17, 1978   _____