

VERTICAL INTEGRATION STRATEGIES OF THE NATIONAL OIL COMPANIES

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INTRODUCTION

THROUGHOUT the twentieth century, the share of oil in world energy requirements and world trade, its relation to world economic growth, its geopolitical role (whereby most of its reserves and production are in areas far from the bulk of its final consumption) as well as the interplay of political and economic factors all contributed to the evolution of oil market relations. The strategic significance of oil and the growth of its consumption in the second half of the century contributed to the flourish of the petroleum industry which dominated the international flow of direct foreign investment between the two world wars and after. For many years, the international oil firms topped the list of the largest world-wide business firms in many financial indicators.

The oil market itself was characterized by different splits and contrasts. On the demand side, there is the difference between crude and product markets, OECD and non-OECD demand patterns. On the supply side, there are the OPEC–non-OPEC relations, local production versus imports, and the evolution of OPEC's quota system.¹ On prices there are the interrelations among the official, spot, forward, future, and formula prices as well as the crude/product prices and netback values.² The industry itself was also grouped at times into majors and independents, nationals and multinational oil firms, integrated versus nonintegrated, and the upstream versus the downstream.

The seventies witnessed major changes in world oil market relations resulting from the transfer of oil-pricing decisions from the companies to the governments

¹ The Organization of Petroleum Exporting Countries (OPEC) was established in 1960. It has eleven members, Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates (UAE), and Venezuela. In 1996 its members held 76 per cent of the world's proven oil reserves, 41 per cent of world oil production, 60 per cent of the world's oil trade, and 10 per cent of its refining capacity (OPEC 1997).

² Formula prices refer to the prices of some crudes that are linked to spot values of other crudes through some equation taking the quality and location differential into account. Netback values refer to the deemed price of the crude netted back from the prices of the products extracted from it in a typical refinery in a particular market. See Horsnell and Mabro (1993).

of the oil producers. The change in the market structure from an oligopolistic (with international oil majors in control) to a cartel (with the governments of OPEC in control) led to changes in the oil industry's structures and strategies. The transfer of ownership of the reserves through nationalization and takeovers in the major oil-producing areas in the Middle East and Venezuela from the major oil companies to government-controlled national oil companies (NOCs) is one aspect of such changes. This transfer ultimately led to a separation between the upstream sector, with NOCs controlling most of the world reserves and crude production, and the downstream sector where the major oil companies controlling the largest share of the refining and marketing aspects in the main consuming areas. This transfer affected the vertical and horizontal characteristics of MNCs (multinational oil companies) and changed oil market structure and stability as well as producer/consumer and seller/buyer relations. Many developments in the oil market, such as the growing importance of forward and futures markets (sometimes referred to as paper oil markets as against the actual physical oil market), could be traced back to that separation.³

Other factors contributed to the disintegration process such as the excessive consuming-government controls, the development of new producing areas in Alaska and the North Sea as well as the politicization of oil relations in the seventies and early eighties due to the different supply crises such as the Iranian Revolution of 1978–79 and the Iran-Iraq war of 1980. The disintegration posed many challenges and opportunities for the international oil companies. Most MNCs went through a process of restructuring which affected business lines and geographic activities. This process intensified in the eighties whereby, through acquisitions or development of new areas, some MNCs added new equity oil to their operations to substitute for the lost equity oil from OPEC countries. Others scaled down their business emphasizing one line and/or geographic area to adapt to the new market realities.⁴

The process of disintegration through the seventies saw also the emergence of NOCs whether in OPEC or non-OPEC. Companies such as KPC (Kuwait Petroleum Corporation), PDVSA (Petróleos de Venezuela SA), Pemex (Petróleos Mexicanos), Saudi Aramco (Saudi Arabian Oil Company), and Statoil (Den Norske Stats Oljeselskap AS, Norway), to name a few, became active participants in the market. Those companies assumed control over huge oil and gas reserves and had control either solely or partly in association with other international companies

³ Concerning the change in the industry's structure and its role in the evolution of Brent forward and futures market, see Horsnell and Mabro (1993, pp. 73–83) and Verleger (1987).

⁴ One major oil company, Gulf Oil, was taken over by another major, Chevron, in a U.S.\$13.2 billion deal in 1984. The value of oil assets transferred through acquisitions and mergers during the first half of the eighties in the United States totaled U.S.\$55 billion. Besides the above deal the other most important deals were: Dupont-Conoco (U.S.\$4.4 billion), Shell-Marathon (U.S.\$6.5 billion), Texaco-Getty (U.S.\$10.1 billion), and Mobil-Superior (U.S.\$5.3 billion).

over the production and marketing of crude oil. There were differences in the business and market experiences of each of these NOCs. But they also shared common features such as the virtual monopoly in their countries over the extraction of oil and gas resources, the support of their governments, and the strong role they play in the economies of their respective countries. Once becoming established in international business relations, and in light of the changing market environment and outlook, those companies confronted new kinds of challenges and choices. The challenges were amplified after 1982 when oil prices started to decline and OPEC adopted production management schemes to arrest the decline using ceilings and quotas. The NOCs had to restructure their business lines locally and internationally to compete and market their continually decreasing market share. They had to redefine their relations with their new shareholders, their respective governments. The move from administered oil prices in the 1975–85 period to a system of market-related prices, whether spot or formula price transactions, affected the market outlook of NOCs and their options.⁵

I. NATIONAL VERSUS INTERNATIONAL OIL COMPANIES

During 1973–74, oil prices and production decisions were taken over through the exercise of sovereignty rights by the governments of the oil producers from the international oil companies. This resulted temporarily in a de-verticalized oil industry, whereby reserves and production was controlled by one set of players, the NOCs, and refining and marketing by another set, the MNCs. Prior to 1973, the seven major oil companies, known then as the Seven Sisters, controlled 70 per cent of the total oil produced in the world (excluding the then communist countries) and had 39 per cent and 77 per cent of U.S. and Middle Eastern oil production respectively. This oil flowed along the integrated system of MNCs through their transport, refining, distribution, and marketing networks. The downstream phases were not very profitable and were put by MNCs to complete the integration chain and dispose of the crude which commanded large rent. But all this changed gradually after what came to be known as the first oil shock of 1973–74 and the second oil shock of 1979–80.

The loss of their vertically and horizontally integrated structures forced the oil majors to restructure in the upstream and downstream. Seizing the opportunities posed by high oil prices, especially after the second oil shock, the MNCs tried to reposition themselves in the upstream by developing new areas and engaging in reserve acquisitions. The downstream sector went through restructuring also as

⁵ Between 1973 and 1978, some sort of working relationship continued between the old concessionaire companies of MNCs and the NOCs who needed the technology and the marketing networks of their former shareholders to market their crude. See Hartshorn (1993).

refining and distribution witnessed changes in ownership patterns. Throughout the eighties, companies were consolidated, refining capacities mothballed, and unprofitable lines of business closed since they were part of the old integrated structure which came under stress.

The NOCs inherited from the MNCs operating in their respective countries dynamic industries with advanced production systems. The choices confronting such companies were different than those of the major oil companies. First of all, on the question of oil production level and capacity, it was argued at the start of the takeovers that the MNCs had a higher discount rate and preferred higher immediate production due to the risk of expropriation associated with their concessions. The NOCs, not confronting similar risk and sharing the concern of their shareholders, the governments, about future generations, would have a lower social rate of time preference and more conservationist policies, favoring lower production levels (Johany 1980).

This property rights hypothesis and differentiated discount rates between MNCs and NOCs were disputed by others. Adelman (1986) argued that the NOCs also generally have a higher discount rate favoring immediate production because the governments have strong appetites for higher revenues to spend on current expenditures, while at the same time many producing governments are autocratic and face the risk of being overthrown, like the risk of expropriation facing the MNCs. Others pointed out that none of the governments of the oil producers and their NOCs publicly adopted lower depletion criteria. During the 1982–86 period as oil prices and OPEC market share declined, member countries squabbled over their quotas; and throughout the production-programming system right up until today, many OPEC member countries produce beyond their allocated quota levels (Hartshorn 1993).

The second area of comparison is related to the degree of commercial flexibility of the national versus international oil companies. On the one hand, the NOCs exercise monopoly rights within their own countries and do not face antitrust laws like those faced by MNCs, which give them more flexibility.⁶ But on the other hand, having the governments as shareholders constrain their investment and production decisions because many political and economic factors determine the ultimate allocation of oil revenues and not necessarily the needs of the industry. For example, while the MNCs could diversify their investment across energy sources and across regions (horizontal integration), the NOCs by virtue of the dependence of their respective economies on oil could not diversify over other energy sources because

⁶ Although there is no international antitrust law, recent debate in the WTO about government procurement practices and the debate within the International Energy Charter Treaty intended to open up the energy sector in the former Soviet Union point to international efforts to address the issue of government monopolies.

this could undermine their strategic depth. Many of them would not invest in the upstream beyond their territories because the returns on similar investment in their low-cost countries are much higher and because outside upstream investment would ultimately compete with their own crude markets.

II. THE NEW PROCESS OF VERTICAL INTEGRATION IN THE OIL INDUSTRY

Theoretically, vertical integration in the petroleum industry is supposed to save storage, refinery design, and a broad category of transactions costs. A vertically integrated firm would have the advantage of being able to “plan capital investments in different phases with perfect coordination. Adaptive consequential decision making can best be implemented by an integrated firm with full intrafirm information flows. . . . Integrated companies have pronounced advantages in the logistics of handling fluid flows” (see Griffin and Steece 1980, p. 295).

In practice, vertical integration in the petroleum industry until the early seventies was a key factor in the effective monopoly power of the oil majors, and the growth of the industry. The integrated structure of the international oil companies changed with the loss of their equity oil in the Middle East and Venezuela. The eighties witnessed major changes in the upstream and downstream business lines of the majors. Seizing on the opportunities posed by high oil prices, they repositioned themselves in the upstream through reserve acquisitions or exploring and developing in non-OPEC areas. Their downstream business lines were also restructured through consolidation, streamlining, and mergers.

The NOCs took control of an efficient upstream industry in their countries. They became sellers of crude oil either to the ex-concessionaires or to other independent refiners who processed their crudes. The NOCs first attempt at vertical integration and capturing the value added was through the construction of “export refineries” in their countries either wholly owned or in joint ventures with other international oil companies. In twenty years, OPEC countries were able to increase the refined products component of their total petroleum exports from 6 per cent in 1976 to 19 per cent in 1996. But the technical and commercial limits to investments in export refineries and the changing market environment necessitated looking to other alternatives for integration. Some NOCs seized the opportunities presented in the downstream restructuring in Europe and the United States by the major oil companies and purchased refining and distribution facilities in those markets. Thus, a new process of vertical integration of the industry started with NOCs as important players.

The first acquisition of refining and distribution facilities by an oil producer started in 1983 when Kuwait’s KPC purchased through its subsidiary KPI some of Gulf Oil’s European downstream assets. Since that time other NOCs followed this

integration trend and entered into joint ventures, acquired shares, or purchased refining and distribution assets in the major markets of Europe, the Far East, and the United States. Table I shows the major international downstream ventures since 1983 which have been made by the national companies of the oil producers.⁷

III. STRATEGIES OF DOWNSTREAM INTEGRATION

Investments in refining and marketing assets in the major markets by the oil producers started in the early eighties when the producers enjoyed higher revenues from higher oil prices. It also coincided with the restructuring trend on the part of the international oil companies after the breakdown of the old governments/companies resource property relationships and the drive by such companies to divest out of nonprofitable business lines. But the reintegration drive continued after the oil price collapse and the resulting decline in oil producer revenues. It is interesting to note that verticalization by the NOCs coincided also with virtual de-verticalization by the international majors. This drive toward integration is due mainly to the more competitive market environment prevailing after the declining monopoly power of OPEC and the declining shares of the major oil producers due to the development of other areas of supply. Reintegration abroad was seen as a way to secure market outlets for a country's crude.

During the 1983–96 period many downstream deals were concluded between major oil producers, mostly through their NOCs, on the one hand, and international companies on the other, involving the purchase of all or part of the refining and/or marketing assets of the latter and covering one or more geographic location. And, as Table I shows, the scope of the downstream integration varied among countries and across deals.

The minor downstream asset holdings of Abu Dhabi for example in Austria, Germany, and Spain are mostly portfolio investments held by Abu Dhabi's IPIC (International Petroleum Investment Company) and not the national oil company ADNOC (Abu Dhabi National Oil Company), although the relations between the two have been close, with the latter represented on the IPIC board. The situation is the same in Libya, where the investments are held by Oilinvest and not Libyan NOC (National Oil Corporation). By contrast all the other downstream investments have been made through the respective NOCs with the specific aim of vertical inte-

⁷ Data and information on NOCs foreign refining capacities, equity shares, and crude supplies are not readily available since few of NOCs publish such information. Therefore, one has to rely on secondary sources which vary in their insight and degree of coverage. An earlier survey by the author (Al-Moneef 1996) looked very different from the one presented in Table I. Furthermore, the equity shares and crude supplies might vary over time as the partners renegotiate the alliance and their terms. The information and data in the table are the most recent that the author was able to compile (March 1998).

TABLE I
PRODUCING COUNTRIES' REFINING AND MARKETING INTERESTS OVERSEAS, 1996

	Sites	Installed Capacity (1,000 bd)	Equity Share (%)	Estimated Distribution Outlets	Estimated Crude Supply (1,000 bd)
Abu Dhabi (IPIC):					
	Germany (1990)	Burghausen	72	19.6	40
	Austria (1994)	Schwechat	210	19.6	40
	Spain (1988)	San Roque	205	10	20
		Tenerife	89	10	60
		Huelva	100	10	10
		Asisa	10	10	
Total		686	14.0		170
Iran (NIOC):					
	India	Madras	131	24.5	20
Kuwait (KPC):					
	Denmark (1983)	Skaeyskoer	59	100	59
	Netherlands (1983)	Rotterdam	80	100	100
	Italy (1996)	Milazzo	240	50	
Total		379	68.3	5,400*	159
Libya (Oilinvest):					
	Italy (1986)	Cremona	95	100	100
	Germany	Harbour	78	66	20
	Switzerland (1990)	Collombey	72	100	70
	Greece		90	14	10
Total		335	69	2,572	200
Saudi Arabia (Aramco):					
	U.S. (1988)	Delaware City	150	50	10,000
		Convent	220	50	
		Port Arthur	245	50	
	Rep. of Korea (1991)	Onsan	525	35	1,125
	Philippines (1994)	Bataan	165	40	964
	Greece (1995)	Corinth	100	50	619
Total		1,405	43.2		1,062
Venezuela (PDVSA)					
	Bahamas	Freeport	500	100	13,000
	U.S. (1983-87)	Lake Charles	320	100	
		Corpus Christi	165	100	
		Lemont	150	50	
		Seaview	84	100	
		Houston	265	30	
		Savannah	28	100	
(Total U.S. & Caribbean)		(1,512)	(83.0)		(633)

TABLE I (Continued)

	Sites	Installed Capacity (1,000 bd)	Equity Share (%)	Estimated Distribution Outlets	Estimated Crude Supply (1,000 bd)
Germany	Gelsenkirchen	227	50	} 145	75
	Neustadt	144	12.5		20
	Karlsruhe	152	16.5		30
	Schwedt	220	18.7		45
Belgium	Antwerp	15	50		10
Sweden	Nynashamm	25	50		24
	Gothenburg	12	50		6
U.K.	Dundee	10	50		10
	Eastham	22	25		22
(Total Europe)		(827)	(28.3)		(242)
Total		2,339	63.5		1,379

Sources: Compiled from *Petrostrategies* (May 14, 1994), *Petroleum Intelligence Weekly* (various issues), Colitti and Simeoni (1996), and APRC (1996).

* Marketing outlets in nine other European countries.

gration. And except for Kuwait's KPC sole ownership of the refining and marketing assets of Gulf Oil in Europe and PDVSA's total acquisition of Citigo Petroleum's assets and Amoco's Savannah refinery in the United States, all other deals involve partnerships with other companies.

Another feature of those downstream investments is that they involve the traditional markets for the crude of the producing country and in some areas (such as KPC's purchase of Gulf Oil in Europe and Saudi Aramco's partnership with Texaco in the United States) they involve deals with an ex-concessionaire who traditionally processed the country's crude.

As to the crude supply arrangements, they differ depending on the type of deal, the configuration of the refineries, and the share of the producing country in the joint ventures (JVs). But since crude pricing in virtually all the deals is spot related, crude supplies from the partner NOC could differ depending on prevailing market conditions. *Petrostrategies* (May 14, 1994) estimated the NOCs' crude supply in 1994 to some twenty-five refineries involved in the producers' international downstream ventures at 2.0 mbd (million barrels per day) from an estimated nameplate capacities of 3.11 mbd. Colletti and Simeoni (1996) estimated the 1994 crude supply at 2.55 mbd from an installed capacities of 4.93 mbd. In our survey for 1996 the crude supply is estimated at 2.98 mbd from an installed capacities of 5.27 mbd. Crude supplies to the refineries vary across countries, where in the case of Venezuela for example, crude supply from PDVSA to its totally owned refineries or JVs is estimated at 59 per cent of capacity: 1.38 out of 2.34 mbd capacity. For Saudi Aramco, the crude supply to its U.S., Korean, and Philippines refineries in

TABLE II
REFINING CAPACITY AND EQUITY SHARE OF THE OIL PRODUCERS
IN MAJOR MARKETS, 1996

	(1,000 barrels per day)							
	United States		Western Europe		Asia Pacific		Total	
	Capacity	Equity Share	Capacity	Equity Share	Capacity	Equity Share	Capacity	Equity Share
Abu Dhabi [IPIC] (246)			686	94			686	94
Iran [NIOC] (1,092)					131	32	131	32
Kuwait [KPC] (797)			379	259			379	259
Libya [Oilinvest] (342)			335	231			335	231
Saudi Arabia [Aramco] (1,670)	615	308	100	50	690	250	1,405	608
Venezuela [PDVSA] (1,183)	1,512*	1,255	827	234			2,339	1,489
Total (5,330)	2,127	1,563	2,327	868	821	282	5,275	2,713
Refining capacity	(15,450)	10.1%	(13,290)	6.5%	(17,595)	1.6%	(46,335)	5.9%

Sources: Table I and OPEC (1997).

Note: Parenthesized figures are for refining capacities in the countries or regions indicated.

* Including a 500,000 bd PDVSA refinery in the Bahamas.

1995 is estimated at 75.6 per cent of overall capacity: 1.062 mbd out of 1.405 mbd capacity.

Another observation of the foreign downstream ventures of the NOCs of the oil producers is that each venture is run independently, to ensure profitability and compatibility with the local economic and political environment. This is an important characteristic of the investments not only from a purely business perspective but also for the benefits of consumers and producers. From the consumers' side this independence eases the old fear of dominance of the oil producers in the final products market. As Table II shows, by the end of 1996 the total capacity that the NOCs of the oil producers had whole or part interest in constitute only 11 per cent of the overall refining capacity in the United States, Western Europe, and Asia Pacific (5.3 mbd total with 2.1 mbd in the United States, 2.3 mbd in Western Europe, and 0.82 mbd in Asia Pacific). The equity share of the oil producers in those refineries is estimated at only 2.7 mbd (1.56 mbd in the United States, 0.868 in Western Europe, and 0.28 in the Far East) which constitutes only 5.9 per cent of the combined capacity of the three regions. Despite that, the concern about oil producer domi-

nance in the downstream sector in the consumer market, sometimes fueled by special interests, still prevails. The row over KPC's purchase of 22 per cent of BP's shares in 1989 and the subsequent order by the British government to reduce that share to 9.9 per cent was an example of such fear.

From the producers' perspective, the independence of international downstream ventures is important for their global crude oil marketing strategy and for the efficient operation of the venture as a separate profit center. If the downstream investment is in a joint venture form with an established refiner/marketer who has knowledge of the market, then independence ensures efficiency and future growth.

Table II also shows that the distribution of refining and marketing investments by the five oil producers in the three markets were as follows: 40 per cent for the United States, 44 per cent for Western Europe, and 16 per cent for Asia Pacific. The most geographically diversified NOC is Saudi Aramco whose crude petroleum export shares to the United States, Western Europe, and the Asia Pacific stand at 25, 28, and 47 per cent respectively, while its share in the equity refining in the three markets estimated at 0.61 mbd are 51, 8, and 41 per cent respectively. Venezuela's PDVSA on the other hand has 84 per cent of its total equity foreign refining capacity estimated at 1.26 mbd in the United States and 16 per cent in Western Europe. All other NOCs have their foreign refining capacities concentrated in one market, Western Europe.

IV. THE ADVANTAGES OF FOREIGN VERTICAL INTEGRATION FOR NOCs

The advantages to the recipient countries of downstream investments by the oil producers in international markets are well recognized in the literature and within the industry. Benefits such as injecting cash into a refining industry in dire need of restructuring along the new demand patterns, fostering competition in the final product market, and enhancing supply security to consumers are mentioned as results from such investments (Terzian 1989; Malin 1989; Abdulla 1995). And although vertical integration is recognized as the linchpin of the industry, the scope, extent, and consequences for the market of such downstream investments by the NOCs is still debated.

From the industry's perspective, vertical integration seeks to spread risk and capture the potential profits at every stage of the chain between wellhead and the gasoline station. Profits of single phases of vertical integration (namely, exploration, production, trading, transport, refining, distribution, and marketing) fluctuate up and down asymmetrically. Integration helps to balance the company's operations and protect it from inherent market instability. Thus when crude prices are low, refining and marketing margins could generally be expected to be positive.

Verleger (1993) found that returns from refining and marketing for the period

1980–90 were negatively correlated with returns from the production of crude oil in six major industrialized countries. His results showed that refining and marketing margins increased by roughly sixty-four cents per barrel for every one dollar/barrel decline in oil prices in Japan and between twenty to twenty-five cents in the other countries. At a crude price of U.S.\$20/bl (per barrel), his results estimated a refining and marketing margin of U.S.\$30.76/bl in Japan, U.S.\$8.32/bl in the United States, and U.S.\$9.57–9.7/bl in the United Kingdom, France, Italy, and Germany.

From the perspective of the oil producers, vertical integration has many advantages. First, it helps in capturing the value added from refining and marketing the barrel of oil. This value added route was taken by all the producers when they embarked on building refining capacity in their own countries for local consumption or exports. Vertical integration abroad extends this search for value added globally and diversifies the sources of income. It also widens the producers' interests to include the value of the barrel sold to the consumer and its determinants instead of the concentration and definition of interests in terms of crude oil price alone (Penaloza 1988).

The second advantage of vertical integration to the oil producers is to keep their share in the market for crude and products and ensure their future growth. This is important at times when the market is more competitive and refiners seek the most secure source of supply. Vertical integration internationally provides this security. This was tested in the fall of 1997 when Korean and other Asian refiners faced credit guarantee problems due to the financial and currency crises in the Asian countries concerned. The Korean Ssangyong refining joint venture with Saudi Aramco did not face such problems due to the crude supply guarantees. This aspect is also important for the exporters of heavy crudes (such as Venezuela and Kuwait) who, through investment in high conversion refineries abroad, guarantee an outlet for their less attractive crudes (Al-Moneef 1996).

The third advantage of vertical integration is that most of the joint venture deals could fall within what Treat et al. (1996) term as "strategic alliances" framework. Such alliances across all industries have been growing lately at an annual rate of 25 per cent. Business alliances such as Disney–Capital Cities, Time Warner–Turner Broadcasting, and NBC–Microsoft are examples of such big deals that are sweeping across industries. Nearly 20,000 alliances were formed worldwide in the last two years, and of the over 6,000 U.S. alliances formed, more than half involve foreign partners. Outside the United States, 75 per cent involved more than one country. The reasons for this growing trend are to share risk, enhance competitiveness by accessing core capabilities to enter new markets, leverage complimentary asset position, and boost market share. A survey of 5,000 U.S. companies between 1987 and 1995 revealed that the average return on investment from strategic alliances was over 16 per cent, which is higher than the industry's average.

The world petroleum industry has traditionally been active through alliances. The old concessions system flourished through consortiums such as the Aramco Four, the Iraqi Petroleum Company (IPC) alliance, and the Iranian Consortiums in the period between the two world wars and after. In the downstream, the alliance of Chevron and Texaco, known as Caltex in Asia, is such an example. The BP-Mobil partnership in the European downstream in 1995, and Amoco-Shell in the U.S. upstream in 1996 are the most recent examples of such alliances in the petroleum industry. In the case of alliances between NOCs and the major oil companies in the downstream sector, the ventures involved could increase the vertical integration index of NOCs but might not be made for that reason by the major oil companies involved in such deals. It seems that each venture or alliance between the NOCs and the major oil companies was done on its own merits and had a certain business background pertaining to the parties involved when the deal was made. The two most important alliances of this type are the Star Enterprise between Saudi Aramco and Texaco and Unoven between PDVSA and Unocal. The first, for example, was made at a time when Texaco was restructuring and seeking a new partnership after its settlement with Pennzoil in the late eighties. Once alliances are formed they can spread across regions, partnerships, and business lines. In 1997 a Texaco-Shell Star Enterprise alliance was formed involving the southern and western U.S. markets (Al-Moneef 1996).

But despite the above advantages of downstream integration to the oil producers, there are some critics of the process. First, there is the rent-value added trade-off involved in the downstream reintegration. According to this view, investment funds directed by the producers to international downstream integration to capture value added would reduce the funds available for expanding upstream production capacity. Each crude barrel produced generates rent far in excess of the value added implied in the downstream investment. The risk associated with downstream investment, according to this view, is higher than the upstream risk, especially those in the low-cost traditional producing areas of the Middle East and Venezuela. Also, at times of strong demand, much of the price increases in products sold in the world markets is transferred to crude oil at the export source.

But while investment in the upstream for rent seems easier and straightforward in the short run, it is no substitute for aggressive marketing to secure outlets for the extra crude in the longer term. Since the sole crude producer can define a price and/or production strategy, the integrated producer also emphasizes the value of the product in the barrel. The last depends from the supply side upon the quality of the product and the efficiency of the marketing structure (Colitti 1993). Also there need not be a contradiction between seeking rent or value added and committing investment to the upstream and downstream. The experiences of Saudi Aramco, PDVSA, and KPC in expanding their upstream capacities and integrating downstream are cases in point.

The second criticism to international downstream integration by NOCs is related to the economics of investments in refineries abroad instead of local refineries. The relevant comparison here would be between building grassroots refinery facilities in the producing country or acquiring existing facilities in the markets of the consuming countries, or between crude versus product transportation economics, in addition to other factors related to environmental legislation and trade barriers across countries. Pure economics suggests acquiring refineries abroad instead of building grassroots export refineries at home (Malin 1989). But other factors pertinent to the situation of each country are also important. For example, Kuwait elected in the mid-eighties to build sophisticated refineries at home to refine its sour crude at times of declining world demand and widening differentials between sweet and sour crudes. And when Saudi Aramco was negotiating in 1990 a downstream joint venture with some Japanese companies to build an export refinery in Saudi Arabia and acquire a share in an existing refinery in Japan, it was deemed then that the economics of the second option was better than the first.

The third criticism centers on the effect of such downstream investments on market stability and performance. Some argued that since international vertical integration is not available to all oil producers because of differences in their resource endowments, a market situation might emerge where there will be traditional integrated MNCs, meganationals (involving the integrated NOCs), and unintegrated companies. The market may be split between the interests of the two whereby the independent refiner and the independent producer will set the price of the incremental barrel. Accordingly, the market might not be as stable as perceived by the oil producers who embarked on downstream integration (Krapels 1991).

Throughout the history of oil, the structure of the oil industry has influenced directly or indirectly prices and market conditions. Even in the seventies when OPEC was on the ascendance, differences between the high- and low-reserves producers existed. Such differences would continue in the market structure since there are differences between producers in their resource endowments, production capacities, and the role and the structure of the oil industry in their countries.

The fourth disadvantage concerning downstream integration by the oil producers is related to the attractiveness of the downstream investments. The refining business has been losing money in the past years in most OECD countries due to many factors such as restrictive environmental standards and high capital and operating costs. The NOCs of the producing countries according to this view end up paying a high price for refineries that may need extra capital injection to bring them into compliance with the new environmental standards. Furthermore, investing in refining capacity abroad might not secure a market share in an environment of spot-related prices from the crude producer to the refinery. The old vertical integration by the majors was undertaken to dispose of their crude in their system at transfer prices. But in the current price regime the sales are spot related, thus a market share

could be secured through competitive pricing without resort to downstream investment (Krapels 1991).

V. THE FUTURE OF NOC VERTICAL INTEGRATION

Through the reintegration of the oil producers in the oil industry, their status and ranking in the international industry have improved over the past few years. A survey by the *Petroleum Intelligence Weekly (PIW)* of the top fifty oil companies worldwide (MNCs and NOCs) representing 952 billion barrels of proven oil reserves (92 per cent of world total), 52 mbd of oil production (72 per cent of world liquid production), 42.4 mbd of refining capacity (56 per cent of world capacity), and 44.8 mbd of product sales (70 per cent of world consumption) revealed the following (*PIW*, December 22, 1997):

- The wholly government-owned oil companies (NOCs) control 81 per cent of world reserves, 47 per cent of world crude production, 18 per cent of world refining capacity, and 22 per cent of world refined product sales.
- The MNCs have control over 19 per cent of world reserves, 53 per cent of world crude production, 82 per cent of world refining capacity, and 78 per cent of world refined product sales. The top five MNCs (Exxon, Shell, Mobil, Chevron, and BP) control 30.7 billion barrels in world reserves (27 per cent of MNCs reserves). Their crude production, refining capacity, and refined product sales shares are 38, 49, and 53 per cent of MNCs, respectively.
- The top five upstream NOCs (Saudi Aramco, PDVSA, NIOC [National Iranian Oil Company], Pemex, and CNPC [China National Petroleum Company]) produced 21.65 mbd in 1996 and had 10.8 mbd domestic and international refining capacity, with an integration ratio (refining/production) of 49.9 per cent. Comparatively the top five MNCs had refining capacity at 14.0 mbd and crude production of 6.97 mbd with a self-sufficiency ratio (production/refining) of 49.8 per cent.

The *PIW* ranking shows eight NOCs in the top ten upstream companies worldwide and four in the top ten companies in terms of refining capacity. In the overall index, six are NOCs, four of those have international downstream presence (Table III).

If one takes the NOCs that are investing downstream and are shown in Table I and compares them to the integration ratios for the five MNCs, one could find room for further integration of downstream by the producers, the extent and scope of which will depend on the future market and investment outlook and the strategies and options of NOCs as well as MNCs. As Table IV shows, the OPEC countries integration ratio is 40.6 per cent while the top MNCs ratio is over 200 per cent (50 per cent self-sufficiency in crude). Some MNCs are more self-sufficient in crude than others like BP, Chevron, and Shell with a self-sufficiency in crude at 60.6 per

TABLE III
THE 1996 RANKING OF THE TOP TEN OIL COMPANIES: UPSTREAM AND DOWNSTREAM

(Million barrels per day)								
Rank	Production	Refining Capacity	Product Sales	Overall Index				
1	S. Aramco (Saudi Arabia)	8.797	Exxon	4.273	Shell	6.316	S. Aramco	100
2	NIOC (Iran)	3.781	Shell	3.791	Exxon	4.733	PDVSA	96.9
3	Pemex (Mexico)	3.277	Sinopec (China)	2.867	Mobil	3.368	Shell	95.8
4	PDVSA (Venezuela)	2.967	PDVSA	2.437	S. Aramco	2.899	NIOC	92.9
5	CNPC (China)	2.828	Mobil (U.S.)	2.297	PDVSA	2.752	Pemex	92.5
6	Shell (Netherlands)	2.213	S. Aramco	1.970	Texaco	2.553	Exxon	92.2
7	KPC (Kuwait)	2.100	BP (U.K.)	1.965	Chevron	2.066	Mobil	81.0
8	Exxon (U.S.)	1.615	Chevron (U.S.)	1.661	BP	1.868	Pertamina (Indonesia)	79.6
9	Sonatrach (Algeria)	1.345	Texaco (U.S.)	1.532	Petrobras (Brazil)	1.725	KPC	78.6
10	NNPC (Nigeria)	1.335	Pemex	1.520	Pemex	1.481	BP	75.2

Source: *Petroleum Intelligence Weekly*, December 22, 1997.

Note: The overall index combine six criteria: reserves and production of oil and gas, refining capacity, and product sales.

cent suggesting more alliances between the two groups in the future. If one goes beyond the traditional markets or partners and look at the emerging markets, further integration could be envisioned.

However, the market environment in the medium and longer terms is characteristically different from the one which prevailed in the early years of reintegration. For example:

- (1) Oil demand in the OECD is projected to continue its slow trend. The global concern over climate change culminated in the Kyoto Protocols which committed the Annex 1 countries, the OECD among them, of the U.N. Framework Convention on Climate Change (FCCC) to reduce greenhouse gases (GHG) differentially among them, reaching an average 5.2 per cent rate of reduction by 2008–12 from the 1990 levels. Since CO₂ is the most important GHG emitted into the atmosphere, and since oil is the most important fossil fuel emitting the gas, most measures to reduce emissions might be directed at oil consumption. Depending on the measures used, the energy market conditions in

TABLE IV
INTEGRATION OF TOP NOCs AND MNCs IN 1996

	Crude Production	Refining Capacity			Integration Ratio ^b (%)
		Domestic	Abroad ^a	Total	
NOCs:					
ADNOC (Abu Dhabi)	1.23	0.246	0.096	0.342	27.8
NIOC (Iran)	3.67	1.092	0.032	1.124	30.6
KPC (Kuwait)	1.81	0.797	0.259	1.056	58.3
LNOC (Libya)	1.39	0.342	0.231	0.573	41.2
S. Aramco (Saudi Arabia)	7.91	1.670	0.608	2.278	28.8
PDVSA (Venezuela)	2.94	1.183	1.485	2.668	90.7
OPEC	25.8	7.769	2.711	10.480	40.6
MNCs:					
Exxon	1.615			4.273	264.6
Shell	2.213			3.791	171.3
Mobil	0.854			2.297	269.0
BP	1.241			1.965	158.3
Chevron	1.044			1.661	159.1
Total MNCs	6.967			13.987	200.8

Sources: Tables I and III, OPEC (1997), and IEA (1997).

^a Based on equity shares of NOCs in the refining ventures.

^b Integration ratio is the total refining capacities divided by crude production.

each of the Annex 1 countries, and many other factors, demand might be reduced in those countries and marginally worldwide. If the attempts to commit other large developing countries (India, China, etc.) to reduce or stabilize GHG emissions do not succeed in the medium term, then most of the growth in demand is expected to come from the developing countries.⁸

- (2) Although the financial and currency crises in some Southeast Asian countries would slow economic growth and oil demand in those countries and worldwide in the short term, the outlook of the IMF and other institutions for the longer term for those countries is for a healthy recovery if economic reform packages are implemented. Reforms in energy prices and energy market regulations could have a positive impact on competitiveness, demand, and business alliances in many Asian countries.

⁸ The IEA (1995) projects a world oil demand growth rate of 2 per cent annually until the year 2010, with OECD demand growth at 1.2 per cent and the developing countries at 4.2 per cent. The World Bank (1995) projects world oil demand growth at 1.6 per cent with the OECD's growth rate at 0.6 per cent and the developing countries at 3.2 per cent annually. Alternatively, OPEC projects world oil demand growth at 1.6 per cent annually into 2010 with 0.5 per cent for the OECD and 4.0 per cent for the developing countries. The range of incremental oil demand forecast in the three models is around 1.3–1.8 mbd annually until 2010.

TABLE V
REFINING MARGINS OF CRACKING REFINERIES IN THE MAIN MARKETS

	(U.S. dollars per barrel)		
	Brent (North West Europe)	WTI (U.S. Gulf Coast)	Dubai (Singapore)
1988	1.82	2.60	2.36
1989	2.02	1.40	3.57
1990	3.01	1.84	4.75
1991	3.76	1.17	6.26
1992	1.85	0.59	3.93
1993	2.03	0.63	4.32
1994	1.49	1.24	2.97
1995	1.15	0.82	2.35
1996	1.51	0.75	3.10

Source: IEA (1997).

Note: Brent crude is produced by the United Kingdom traded mainly in Europe and is quoted in London's IPE, while WTI is a blend crude produced in Texas, and quoted in NYMEX. Dubai is produced by the United Arab Emirates and is traded in the Far East. The three crudes are the markers to which the prices of most other crudes going to the three markets are linked through formulas.

- (3) Restrictive environmental regulations in OECD countries concerning oil product specifications and pollution abatement would continue to change demand patterns affecting refinery configuration and profitability.
- (4) The growing competitive nature of the oil market in the upstream and downstream and the growing size and role of the forward and futures markets in crude oil and products, and the active participation of the NOCs in those markets, will affect the strategies, options, and business environment of those companies.

The above factors, while they might not change the course of reintegration of the oil industry, could pose many questions as to its future trend. From 1983 through 1996, out of twenty-three downstream deals concluded by oil producers, only two were in countries of the Far East; the rest were in the United States and Europe. This could be due to the regulatory environment in those countries, which is changing rapidly. Deregulation of the petroleum sector in Japan in 1997 involved gasoline price decontrol, and lifting restrictions on product imports and service station construction. One could envision more downstream integration by producers in Asian markets considering their attractive margins. Recent media reported discussions between Saudi Aramco and China's Sinochem and Sinopec about the possibility of two refining joint ventures in China. A closer look at the refining margins of Dubai crude in the Far East compared to West Texas Intermediate crude (WTI) and Brent crude blends in the U.S. Gulf Coast and North West Europe respectively over the past nine years show a trend of commanding margins over the other crudes in the other markets (Table V).

The second aspect of this new market environment is the growing energy needs of developing countries especially for electricity generation. The World Bank projected the annual growth rate of demand for electricity in those countries at around 5–7 per cent. This entails increasing demand for fuels to generate the needed capacity. One could envision fuel oil regaining some of its lost share in the electricity generation sector, through some alliances between the oil producers and the power companies or the refiners in major developing countries. News media reports in 1998 said that Saudi Aramco and Hindustan Petroleum Company of India were studying a joint venture refinery and power plant project in Punjab, India (*Middle East Economic Survey*, February 16, 1998).

The third aspect of reintegration which is frequently referred to is some sort of downstream/upstream swap between the oil companies and the oil producers. The new fiscal regimes in some oil-producing countries allowing foreign upstream investments on equity terms is seen as a bridge point whereby some of the producers who were not able to integrate could use this vehicle to own some downstream assets abroad (Verleger 1993, p. 183).

The extent of the use of this aspect depends on the situation in each country. Some producers, most notably Saudi Arabia and Kuwait, might not need foreign investments to increase upstream capacity since they have access to technology and financing and have excess capacity in place. Others may prefer not to pursue the downstream route because of the higher return on the upstream relative to the downstream.

But no matter how geographically diversified or intensive the reintegration process is, most of the supply/demand projections point to an increasing share for Middle East producers in the incremental world oil demand into the next century. This means that the increase in downstream capacity abroad for those countries, if it materializes, would also be matched by increasing demand for their crude.

Furthermore, the investment needed to increase or maintain existing capacity and increase downstream presence in markets abroad would be enormous and might not be within some countries' financial or borrowing abilities, considering the constraints their fiscal government budgets face. If this persists, it could slow down the pace of reintegration by the oil producers and downstream integration would be more selective across markets and investment opportunities.

CONCLUSION

The vertically and horizontally integrated structures of the oil industry which dominated the market until the early seventies came under stress when the governments of the oil producers took control of reserves and production through nationalization and takeovers. New entrants into the oil market, the NOCs, dominated the upstream while the MNCs continued to dominate the downstream ends (refining

and distribution). The upstream/downstream split continued until the early eighties, when the decline in oil demand, increasing production from new areas, and the restructuring process of MNCs made the market more competitive, reducing the effectiveness of the OPEC cartel. The NOCs had to compete for markets and had to restructure themselves in accordance with the new market realities.

Some NOCs, keen for market share and value added, embarked on downstream investments in the main consuming markets. Through joint ventures or wholly owned refineries and distribution outlets, they managed to increase their equity shares in the refining capacity in those markets by 2.6 mbd and have access to 5.3 mbd refineries. The reintegration process and strategies differed across NOCs and the MNCs depending on many factors such as the asset base, market environment, and company liquidity. The integration ratios of MNCs differed with PDVSA of Venezuela the highest at 91 and an average ratio for the six NOCs surveyed of 42 per cent. By contrast the top five oil MNCs have an integration ratio of 200 suggesting room for further alliances between the two groups.

Despite many advantages to vertical integration by the NOCs into the main consuming markets, such as capturing the value added, securing market outlets for crude, and forging strategic alliances for future growth, there are various criticisms against reintegration by NOCs abroad. One is related to the trade-off between rent (from investment in crude production) and value added (from investment in refining and distribution). Since the first is clearly higher than the second, the investment downstream is seen as not rewarding. The second criticism relates to the effect of reintegration on the crude producers' market power (the OPEC cartel) which has already been eroding due to factors other than the industry's reintegration.

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