This paper first explains the substantial weakening of the arrangements that have given national oil companies in the OPEC countries exclusive access to their oil reserves. Although those members of OPEC with large reserves — the Gulf countries and Venezuela — manage to preserve the old system, that is not the case for member countries which have difficulty in maintaining their production and proven reserves. The second part of the paper sets out the new international arrangements that have taken shape in the upstream portion of the world oil industry. It highlights what is happening in the important oil-producing developing countries, and the potential and the uncertainty involved in cooperative agreements with the former Soviet Union.

On propose d'abord des facteurs explicatifs de la fragilisation en profondeur de la règle mise en oeuvre par l'OPEP quant à l'exclusivité d'accès à leur sous-sol au bénéfice de leur firme nationale publique. Si les pays à grandes réserves (Golfe et Vénézuela) arrivent à maintenir ce système, il n'en va pas de même pour ceux qui renouvelent à peine leur potentiel pétrolier. Puis on fait un bilan des nouveaux types d'accords internationaux dans l'amont. On distingue les perspectives des pays producteurs en développement à large potentiel pétrolier et d'autre part les promesses et incertitudes de la coopération avec l'ex-URSS.

Oil Exploration and Production Between the 1980s and 1990s: Geological Advantage and International Petroleum Orders

BERNARD BOURGEOIS and
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Introduction

After the oil price shocks of 1973-74 and 1980-81 and in the aftermath of the nationalization policy pursued by OPEC countries, the centre of gravity of the international oil industry shifted toward the producing countries, the new masters of upstream oil rents. In the 1970s and the early 1980s, the majority of observers were convinced that these countries, as the beneficiaries of these oil rents, would ultimately control the industry.

In this OPEC-dominated international oil order (Bergesen, 1989; Bergesen et al, 1990), the basic rule governing access to the reserves of member states was that their oil industries should be developed within a strictly national framework: "Member Governments shall endeavour, as far as feasible, to explore and develop their hydrocarbon resources directly" (OPEC, 1968). One of the consequences of this policy was that in exploration and production activities, the national (usually state-owned) oil company was granted a monopoly over access to oil reserves. The multinational corporations were officially denied such access and were tolerated only in

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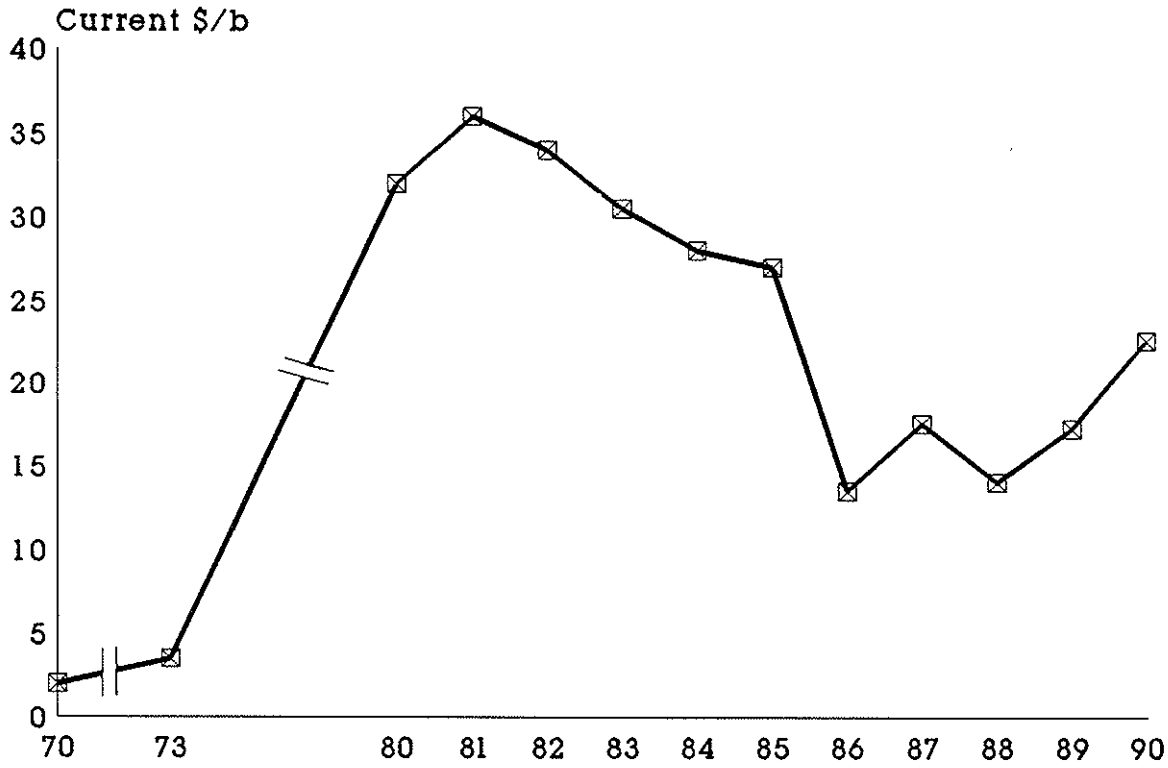

Figure 1: Average price per barrel of oil in current dollars

Source: OPEC, average export revenues

the role of service companies.[1]

In the early 1990s, this pattern of relations underwent a profound change: a new climate of relations developed between producing countries and multinational corporations that held out the prospect of a new petroleum order, one based on cooperation. In this paper, we shall attempt to gauge the extent of the changes that took place in exploration and production activities between the 1980s and 1990s, in particular through the new role of geological advantage. We begin by assessing the shifting balance of power between the players as the OPEC-dominated order declined during the 1980s, before going on to discuss the prospects for a new world order for exploration and production characterized by cooperation in the oil-producing developing countries and in the Soviet Union.

1. Limits to the Monopolization of Geological Advantage in the OPEC-dominated Order

The early 1980s were characterized by the transition from a sellers' market to a buyers' market. Prices have been falling since the peak reached in 1981.

Price declines and volatility have affected all the actors involved in oil production and have had an impact on the performance of both public and private companies in producing and consuming countries, as well as on the policies of the countries concerned. In an ordinary competitive

1/ Note, however, that there were from the outset some fairly major exceptions to this principle in certain member states, notably Gabon, the United Arab Emirates (UAE), Indonesia, Nigeria, Ecuador, and Libya.

system, a situation of temporary overproduction would tend to eliminate the highest-cost non-OPEC producers. Yet all the evidence would suggest that the OPEC countries and companies have been unable to reap the benefits of their enormous comparative advantage in hydrocarbon geology, and have been placed in a defensive situation where they are forced to slow or abandon their efforts to dominate the industry.

To explain this reversal, we must take into account comparative advantages other than geological ones in analysing the competitive situation. In this case, that means the advantage for a given player of market power in the downstream market and of its overall ability to adapt to a new environment. Western companies have demonstrated a comparative advantage in these areas that at least partially offsets their geological disadvantage.

Before examining the policies pursued by the various actors, the differences in geological advantage between the two major groups should be considered. For this purpose, "upstream" positions at the beginning and end of the period are described according to three common indicators for oil and gas: developed and undeveloped proven reserves, theoretical lifetimes of these reserves as a ratio of annual production (the R/P ratio), and annual production as a proportion of the world total (see Table 1).

The 1980s were characterized by a widening gap between the proven reserves of the two groups. While the absolute value of the oil and gas reserves controlled by western companies has remained approximately the same, their relative share of the world total has fallen from 9% to 5%. For the OPEC group, the volume of these reserves has doubled, leading to an increase in their relative world share of approximately 21 percentage points for oil and 31 percentage points for gas. Although the production indicator substantially narrows the difference in reserve positions, Table 1 highlights some of the consequences of the significant differences in their respective geological advantages.

1.1 Western Companies: How to Replace Medium-Term Reserves in an Unpredictable Short-Term Environment?

Despite their individual character, the strategies of western companies display a number of common features. In terms of weaknesses, their vulnerable position as far as reserves are concerned has been well known since the era of nationalization. In the 1970s, reconstituting some of these assets in politically "safe" regions was an absolute imperative. Many of these companies, especially the historical "majors" (Bourgeois and Perrin, 1987), withdrew to their home countries, the United States, Canada and the British North Sea. But this geographical reallocation was called into question in the 1980s for two reasons: first, the reserves discovered in the 1970s were not replaced, and, second, finding costs in these regions were high — between $10 and $14 per barrel in the United States and in Western Europe compared with $1 to $10/b in the rest of the world.[2]

The strengths of these companies have enabled them to compensate for this geological handicap — a lack of access to abundant, low-cost reserves — but in an unequal and partial manner.[3] A number of adaptation strategies have been adopted:

- adjusting their portfolios of production assets, even by divestment in order to concentrate on the most productive and least risky deposits, or by purchasing in-ground reserves, thereby bypassing the risky exploration/discovery phase;
- developing a more efficient combination of production techniques either through technological advances (Jacquard, 1990; Bour-

2/ Prices in this article are expressed in US dollars.

3/ Where firms were unable to develop such offsetting advantages, they either abandoned the sector by selling their downstream assets — like Tenneco, which liquidated its assets in 1988 — or, as was most frequently the case, they were absorbed by other larger western firms with a more solid financial base. US independents, both large and small, as well as the majority of the British independents, were the main victims of this process of reconcentration.

Table 1: Upstream positions of the groups of actors (1980-1990)

		Western firms			OPEC firms or countries			World
		US-based[1]	Europe-based[2]	Total	Leaders[3]	Rest of OPEC[4]	Total	
1980 Positions								
Oil	Reserves (Mb)[5,6]	29,944	21,785	51,729	311,956	64,506	376,462	591,091
	R/P (years)	9.7	14.5	11.3	44.7	26.7	40.1	27.1
	Share of world production (%)	14.1	6.9	21.0	31.9	11.1	43.0	100.0 (21,803 Mb)
Gas	Reserves (Mboe)[7]	25,019	12,342	37,361	106,142	45,111	151,253	463,287
	R/P (years)	14.5	16.7	15.1	361.7	169.3	271.0	49.9
	Share of world production (%)	18.6	8.0	26.6	3.2	2.9	6.1	100.0 (9282 Mboe)
1990 Positions								
Oil	Reserves (Mb)	26,735	23,934	50,669	742,849	66,573	809,422	959,494
	R/P (years)	10.4	14.1	11.9	120.9	29.4	96.3	43.0
	Share of world production (%)	11.6	7.6	19.2	27.5	10.1	37.6	100.0 (22,318 Mb)
Gas	Reserves (Mboe)	21,949	15,588	37,357	210,836	88,047	298,883	732,127
	R/P (years)	12.1	14.2	12.8	314.0	123.4	216.0	55.0
	Share of world production (%)	13.7	8.2	21.9	5.0	5.4	10.4	100.0 (13,313 Mboe)

Notes

1/ The sample of US-based firms in 1980 comprised: Exxon, Mobil, Texaco, Chevron, Amoco, Gulf, Arco, Conoco, Phillips, Sohio, Sun, Occidental, Unocal, Marathon and Getty; by the end of the period, the reserves of Gulf, Sun, Marathon, Getty and Sohio had come under the control of, respectively, Chevron, Oryx Energy, USX, Texaco and BP. Figures for reserves include those located in Western Europe.

2/ The sample of Europe-based firms comprised: RD Shell, BP, ENI, Total, SNEA; figures for reserves include those located in the United States.

3/ The "leading" OPEC countries traditionally comprise: Venezuela, Saudi Arabia, Kuwait, Iran, Iraq and the UAE.

4/ The sample of other OPEC countries comprises: Indonesia, Algeria, Libya, Ecuador, Nigeria, Gabon and Qatar.

5/ In the case of the public companies of producing countries, the figures for their reserves, with a few exceptions (Saudi Aramco, PDVSA), were not directly available; hence national figures were used instead. This approach may pose problems for countries in which nationalization was not complete. In at least six OPEC countries, foreign companies retain ownership rights over OPEC reserves. In the absence of clear and direct information on this "sensitive" subject, an indirect indication may inferred from the national companies' share of member countries' oil production; according to the OPEC *Annual Statistical Bulletin*, in 1989 this figure was 25% in Gabon, 49% in the Emirates, 52.5% in Indonesia, 67.5% in Nigeria, 71% in Ecuador and 74.5% in Libya. Foreign companies can be assumed to make up the difference between these figures and 100%.

6/ Millions of barrels.

7/ Million barrels of oil equivalent.

Sources: 1) Western companies: annual reports; 2) OPEC countries and world: oil reserves and production, gas reserves: *World Oil*, tabulation by Midoil (IEPE); 3) gas production: CEDIGAZ, *Le gaz naturel dans le monde*, 1991.

Table 2: Finding costs of oil production during the 1980s

Unit cost in $/b	US	Latin America	Western Europe	Middle East	Africa	Asia & Australia
On-shore	14.5	8.2	5.2	1-2	4.3	7.3
Off-shore	13.5	10.6	12.8	3.4	5.5	7.1

Source: IFP, Economic Department (1990).

geois and Martin, 1989) to reduce capital outlays and operating costs,[4] improve recovery rates, reduce the number of unproductive wells, etc., or by reducing overhead costs through measures such as trimming staff — in short any method of lowering fixed costs;

- generating additional cash flow by increasing production or selling off petroleum or non-petroleum assets, assuming that a market could be found, and that the petroleum resource base and the company's core assets would not be jeopardized. From this standpoint, western companies that engaged in corporate diversification in the late 1970s found themselves obliged in the 1980s to liquidate the bulk of the assets so obtained in order to finance the acquisition of hydrocarbon reserves.

In the final analysis, the real competitive advantage of these companies lies in their ability to implement what some of their executives call the "imperative of flexibility," the overall ability to adapt.

However, an examination of upstream positions reveals differences between US and European companies (Table 1). While the latter increased their reserves slightly during the period,[5] the 14 American companies as a whole lost 11% of their oil reserves and 12% of their gas reserves between the beginning and end of the period. A follow-up study, conducted by the Energy Markets Bureau of the US Department of Energy (1991), which covered some 20 US oil companies since 1977, confirmed this finding.[6] Their upstream activity in the US showed a clear decline, paralleling the decline of their domestic base, despite the major restructuring efforts of the oil companies aimed at restoring profitability. The reserve replacement rate[7] is generally 90%, including acquisitions, accounting for an average of 10% of total additions to reserves over the period. Between 1980 and 1989, the overall profitability[8] of upstream activities fell from 22% to 5%. If we make the same profitability comparison between the US and the rest of the world, however, there is a nearly constant gap of 5% to 8% over the period to the disadvantage of the US. The dilemma facing the major American corporations is to find a way to overcome the geological handicap of their domestic base, which in 1989 still accounted for two-thirds of their oil reserves. Besides the financial restructuring alluded to earlier, their principal strategic response has been once again to shift the allocation of exploration and production capital spending towards areas outside the US: while the proportion during the 1981-85 period was 3 to 1 in favour of the US (respectively $30 billion and $10 billion in current dollars), the trend had reversed

4/ For example, and to provide a general benchmark, the CEO of Total set the following objective for French firms: "lowering the technical cost of exploration/development to less than $7 a barrel." Source: *Bulletin de l'Industrie Pétrolière*, November 21, 1990.

5/ Even when the special case of Royal Dutch Shell, recognized as the world leader in the industry, is excluded from the sample.

6/ The DOE sample in 1989 included the following firms: Amerada Hess, American Petrofina, Amoco, Ashland Oil, Arco, BP America (Sohio), Burlington Resources, Chevron, Coastal, Du Pont de Nemours (Conoco), Exxon, Kerr McGee, Mobil, Occidental, Oryx Energy (Sun), Phillips, Shell Oil, Texaco, Total Petroleum, Union Pacific, Unocal, USX (Marathon).

7/ Defined as the ratio of additional reserves to production over a given period.

8/ Defined as the ratio of "net income contribution" to "net investment in place."

by 1986. Parity was reached in 1989 with $15 billion of investment in each zone. Indications are that the US will receive only a minority share of the capital spending of these companies in the years to come.

The European oil companies, for their part, have succeeded in achieving better "physical" performances than their American competitors, since their 1989 reserves were, on average, 20% higher than in 1980. Two sets of factors may explain this superior performance. First, the production assets of European firms are located in less unfavourable petroleum zones than those of the US, specifically in the North Sea, Angola, Nigeria, Gabon, Indonesia and Malaysia. Given the same level of technology, more favourable geology allows higher rates of reserve replacement. Second, European firms, while subject to competition, have benefited from a less "aggressive" financial and stock market environment for industrial firms with a long-term perspective, since European shareholders tend to be less demanding than their US counterparts. Less emphasis on short-term profitability has meant more financing available for investment.

1.2 Developing Producer Countries: How to Defend Exclusive National Rights in a Context of Macroeconomic Adjustment Difficulties

Despite the differences among the oil companies of developing producer countries, most share a common trait — they have not been in business for very long.[9] As of 1980, they had at most ten years of operational experience and, in most cases, less than five years. Their management is strongly dominated by the political decisions of the state, which protects their operations (as they do for other infant industries) by imposing legal barriers to competition from foreign firms. That is why these firms are frequently dubbed "OPEC companies," reflecting the closely intertwined relationship between these states and their national companies. But the 1980s upset this realignment of competitive handicaps: governments in difficulty due to falling tax revenues from oil were prone, in their role of sole shareholder, to transmit their problems to the national oil companies. However, the ability of these companies to weather this crisis varied greatly depending on the extent of their geological advantage in their respective countries. Based on this geological differentiation, at least two kinds of firms may be distinguished (see Table 1):

- on the one hand, the national firms of leading countries with many years' worth of reserves of global importance, such as PDVSA (Venezuela), Saudi Aramco (Saudi Arabia), KPC (Kuwait), NIOC (Iran), INOC (Iraq), and ADNOC (Abu Dhabi);
- on the other hand, the national firms of second-tier producing countries, such as Pertamina (Indonesia), Sonatrach (Algeria), NOC (Libya), CEPE (Ecuador), NNPC (Nigeria), Petrogab (Gabon) and QGPC (Qatar).

The companies in the first group were at least partially successful during the 1980s in solving their main strategic problem; namely, how to convert their real or potential geological advantage into a competitive advantage on the oil markets. For these firms, the priority was not so much to renew reserves as to bring them into production and market their output. During the period, progress was achieved on both these fronts.

In order to master the processes involved in developing and managing reserves, technology training programs were maintained, and even expanded, sometimes with the help of service companies and even foreign operators. This ongoing process, which will probably extend over several decades, was studied by Naimi (1987), who distinguished three stages. The first stage involves the introduction of modern technology and its use by local workers. The second involves the maintenance of this technology by local personnel without the assistance of foreign experts. It is only during the third stage that national oil industry employees are able to adapt and improve the acquired technology. Saudi Aramco executives estimated in 1987 that they had reached the end of the second stage. PDVSA and KPC could probably make similar claims.

9/ This sets aside the establishment of Pemex in 1938, Petrobras in 1953, EGPC in 1956, and ONGC in 1959 as exceptions.

To secure their markets, these companies have pursued downstream integration not only in their home countries, but also abroad, despite OPEC constraints limiting their room to manoeuvre. This is an important new strategic development.

For the second-tier group of companies, the strategic problem of development became much more difficult to solve during the 1980s, since in addition to the competitive handicaps of the leading firms, they were hampered by two other unfavourable factors. First, their much less advantageous geological situation meant that these companies were faced with renewing their reserves in an unfavourable national and international macroeconomic context. Table 1 shows that while gas reserves increased substantially (nearly doubling between 1980 and 1990), the same cannot be said for oil reserves, which basically stayed the same. Second, to a greater degree than the firms of leading OPEC countries, these companies must bear the negative consequences of macroeconomic imbalances in producer countries.

The post-1980 drop in oil revenues affected all the producing countries. The impact on economic growth was particularly severe in undiversified economies still dependent on the hydrocarbon industry (i.e., still at an early stage of development). The international context of falling prices made macroeconomic adjustments necessary in all producing countries, but these were particularly severe and difficult to implement in countries at an early stage of development. These adjustments placed new constraints on the governments and national companies of these countries, forcing them to modify their oil policy strategies to varying degrees depending on their ability to weather the crisis.

According to IMF data, oil and petroleum products accounted for 50% or more of total commercial exports in 18 countries. These include the 13 member states of OPEC, plus Cameroon, the Congo, Mexico, Oman, and Trinidad and Tobago.

These countries share a number of characteristics:

- in the 1982-87 period, GDP growth was approximately one-fifth of its level during the 1972-81 period, 1.1% versus 5.9%. Per-capita growth has been negative since 1982;
- export volumes have fallen sharply: for OPEC there was a decline of two-thirds between 1982 and 1986. Given the variation in the relative prices of exports and imports, the purchasing power of exports has decreased five-fold;
- the current account has posted a deficit over the entire period, with the exception of 1985.

As in all other countries, efforts to counter internal and external imbalances did not begin immediately. Furthermore, it took time to achieve results since the adjustments required were structural rather than cyclical. The objective was not so much to adapt an oil-based economy to lower oil prices as to redefine industrialization strategies based on raw material wealth. In his analysis of initial industrialization policies in eight developing countries,[10] R.M. Auty (1990) showed that the results have largely been negative. The success of these policies depended on their spin-off effects, and several of the conditions necessary for these effects to be felt were not met.[11]

The nationalistic oil strategies pursued by OPEC countries conflicted with the need to cooperate with the multinational corporations. The most spectacular failures occurred where none of the necessary conditions for the propagation of spin-off effects was met, where state intervention was ubiquitous, and where population growth absorbed any gains in output growth. As Ikonicoff (1987) pointed out, under such conditions industrialization strategies lead to an increase rather than a decrease in foreign debt. In virtually all the producing countries, oil rents were insufficient to meet financing requirements and indebtedness grew dramatically.

10/ Venezuela, Trinidad and Tobago, Nigeria, Cameroon, Saudi Arabia, Bahrain, Indonesia, and Malaysia.

11/ Such conditions include projects large enough to benefit from economies of scale, but with a limited role in the national economy so as not to make the country too vulnerable to cyclical downturns in the sector; staggered scheduling of projects, significant reliance on the expertise of multinational corporations and export markets.

Table 3: Variation in macro-economic indicators of fuel exporting countries during the 1980s.

	1972-81	1982	1983	1984	1985	1986	1987	1988	1989
Annual variation in GDP (%)	5.9	0.8	-0.5	0.4	1.5	-0.1	0.3	2.9	3.4
Annual variation in per-capita GDP (%)	2.0	-2.4	-3.7	-2.7	-1.4	-3.3	-3.4	-0.1	0.4
FOB exports ($ billion)									
- of sample total	na	250	211	209	188	126	152	149	180
- of OPEC Gulf states	188	133	95	84	73	47	59	54	75
- of rest of OPEC	97	70	62	60	55	30	33	32	41
Annual variation in purchasing power of exports (%)[1]	15.6	-15.7	-13.2	0.5	-8.5	-39.5	11.8	-8.6	19.0
Current account ($ billion)	na	-14.3	-15.7	-0.6	3.4	-31.8	-4.1	-20.7	-6.0

Sources: IMF, *Perspectives de l'économie mondiale*, October 1990; OPEC, *Annual Statistical Bulletin*, 1989.
na = not available;
Note: 1/ Defined as export revenues deflated by import prices.

Table 4: Changes in the external debt indicators of OPEC countries (1980-1989)

	External debt ($ billion)		Debt/GDP (%)		Debt/exports (%)	
	1980	1989	1980	1989	1980	1989
Algeria	19,377	26,067	46	55	140	246
Ecuador	5,997	11,311	54	118	242	481
Gabon	1,513	3,176	40	111	70	199
Indonesia	20,944	53,110	30	62	87	245
Iran	6,200	5,000	7	3	44	37
Iraq	na	85,000	na	129	na	582
Kuwait	na	7,250	na	23	na	64
Libya	na	na	na	na	na	na
Nigeria	8,934	32,876	10	156	34	338
Saudi Arabia	na	na	na	na	na	na
UAE	na	10,998	na	40	na	71
Venezuela	29,330	33,144	49	81	153	259

Sources: World Bank, *World Debt Tables*, 1991; *L'État du Monde*, 1981, 1991 (Annuaire économique et géopolitique mondial; Paris, Éditions La Découverte)

To cope with this debt under the constraints imposed by international financial organizations, governments implemented austerity measures, sought to lower government deficits by reducing subsidies and transfers, and cut or substantially reduced the investment programs of their national companies, including the upstream and downstream investments of their national oil companies. These issues were of particular importance in such countries as Algeria, Indonesia, Iran, Iraq, Nigeria and Venezuela, where accumulated debt service represented a

major constraint. Other major exporting countries were much less constrained by such factors (Borpujari and Melhem, 1990). Saudi Arabia, the UAE, Kuwait, Libya, Oman, and Qatar were able to achieve substantial reductions in government expenditures.

* * *

Based on the evidence presented above, it is possible to make two broad statements about the upstream activities in the oil industry of the 1980s.

1) Countries with large reserves have maintained the rule of exclusive access to resources, which means that they continue to enjoy a national monopoly over their geological advantage. During this period, these countries displayed two common traits: they doubled their already large reserves, and they succeeded in keeping the initial structure of their industry, dating from the 1970s, intact. With the exception of the UAE, all these countries completely nationalized their industries. Foreign companies were tolerated on the national territory only as suppliers of services. The geological advantage of these countries is so great that the upstream rents generated by their national companies offset any weaknesses in other areas, including those of their state shareholder.

The remaining OPEC countries (Indonesia, Algeria, Libya, Ecuador, Nigeria, Gabon) barely managed to maintain their 1980 levels of proven oil reserves. This is a poor showing, given their potential geological advantages. To avert production declines, they were often forced to sign association agreements with international companies, or to grant mineral rights in the form of production-sharing contracts or risk-service contracts. In the majority of these countries, moreover, debt constraints severely restricted the freedom of action of governments. Falling prices have enabled foreign companies to demand and get better tax treatment, as well as access to deposits on more favourable terms.

Western companies, for their part, have been able to maintain significant strategic potential. By the early 1990s, the largest of these companies had maintained their capacity for action by successfully consolidating or developing their strengths: technological expertise, organizational capability, mobility of assets and upstream market power. This ability to adapt has largely offset the relative decline in their control over world reserves. Furthermore, upstream internationalization had resumed by the mid-1980s, at least in the second-tier producer countries.

2) While the rules of the game under the OPEC order were maintained in the upstream activities of first-tier countries, the underlying fragility of this petroleum order soon made its limitations apparent. Three factors may be advanced to explain the weakening of OPEC:

a) The economic systems of the consuming countries grew stronger during the 1980s, while those of the producing countries weakened. This weakening was particularly acute in the developing producer countries, with mounting foreign debt and the rising social cost of adjustment policies being the most visible signs. The governments of these countries, as guarantors of the institutional barriers protecting the exploration and production activities of their national companies, were therefore in a weak position vis-à-vis the demands of the foreign oil companies.

b) OPEC as an institution was weakened by growing differences between the positions of its two groups of member states. Sharply differing trends in the evolution of discovered reserves and the largely foreign-based downstream integration strategies pursued by first-tier actors made it difficult for OPEC to speak with one voice. Such differences, which seem to have intensified in the 1980s, posed a constant threat to the internal cohesion of the organization.

c) OPEC has been shown to be unable to control the market, and hence to set prices, in periods when demand is relatively weak. Setting production quotas and/or target prices has become a source of constant internal confrontation, further undermining internal cohesion.

2. The Sharing of Geological Advantage in the New Cooperative Order

The transition from the 1980s to the 1990s has been marked by changes in the geopolitical landscape. Foremost are the changes in East-West relations that have taken place since 1985, precipitated by *perestroika* and *glasnost* in the Soviet Union. Changing North-South relations, including changes in the attitudes of major oil-producing LDCs towards western companies, may also be partly attributed to the end of the Cold War. In the hydrocarbon sector, the Gulf War may prove to have been the event that triggered the weakening and transformation of the OPEC order. From this standpoint, the early 1990s may mark the beginning of a new international petroleum order characterized by cooperation between companies and governments. Three sets of facts may be advanced to support this hypothesis:

- new types of upstream agreements;
- an increase in the downstream integration of producing countries in the industrialized countries; and
- a desire on the part of producing countries and most consuming countries to ensure a degree of market stability (Finon, 1991).

There follows a description of the various forms that the process of cooperation has taken in practice in the upstream sector of the world oil industry and an outline of the issues that this raises. We examine first those developing producer countries with the greatest oil resources, and then the former Soviet Union.

2.1 New Forms of Cooperation in Developing Producer Countries with Large Oil Potential

Hardly a day passes without the appearance in the professional literature of an article on new forms of producer-consumer cooperation in the world oil industry. Yet the word "cooperation" has been bandied about since property rights over a portion of in-ground reserves were exchanged for capital, technology and organizational know-how from western companies. In what way do the traditional agreements under the old petroleum order dominated by the majors — and those under the OPEC order — differ from those typical of this new petroleum order?

To make the difference clear, a distinction must again be drawn between the leading players and the second-tier players among the companies or governments of developing producer countries. By the late 1980s, the former group had succeeded, although not to a uniform degree, in establishing national oil industries of genuine international significance, even by comparison with western companies. To determine who belongs to which category, we may rely on the four distinguishing criteria used by Coronel (1988) in his study of state-owned oil companies in Latin America: experienced personnel, sound management, modern technology and financial independence. We add to this list the criterion of reserve size.

When "cooperation" agreements are signed between first-tier companies and western multinationals, it may be assumed that the overall difference in their respective competitive advantages is small enough to make a genuine partnership possible. The leading actors of the producing countries are also able to exercise a certain degree of control over their partners by buying a stake in them or even gaining industrial control over their assets.

However, during the period of OPEC domination, the small producers (Gabon, Ecuador) and middle-ranking producers (Nigeria, Indonesia) were unable to achieve a sufficiently advanced level of development of their national oil industries to acquire strategic autonomy vis-à-vis western companies. Because their competitive situation is so very unequal, the terms of so-called "cooperation" agreements between these actors are also unequal, with an uneven division of risks, responsibilities, and remuneration. The relationship is better described as one of "cooperation-domination," even though new contractual arrangements have been developed.

We shall therefore examine only those agreements that are representative of cooperation-partnership, which the president of OPEC, Sadek Boussena, defines as "new types of indus-

trial cooperation, incorporating a two-way partnership, based on shared risks and revenues" (*Pétrole et Gaz Arabes*, 1991a). In addition to the agreements with Venezuela, Iran, and Saudi Arabia[12] — all first-tier actors — the arrangements entered into by Algeria are also examined. The innovations introduced by this country since 1986-87 have served as a model for other OPEC members.

THE ALGERIAN APPROACH: THE "PARTNERSHIP AGREEMENT"

Since Algerian law does not yet allow either the granting of concessions to foreign companies for existing oil fields or the granting of gas concessions, Sonatrach and Total have devised the formula of "advance sales" in order to circumvent these legal restrictions. This formula is perhaps best exemplified by the agreement between the two companies to develop the Hamra gas field, which contains 100 Gm^3 of gas, 10 Mt of condensates and 10.9 Mt of LPG, and which calls for capital investment of $520 million. In exchange for financial advances (approximately two-thirds of the total cost) and a technological contribution, Total will have access to the field's entire production of condensates and liquefied petroleum gas (between 150 and 200 million barrels of oil equivalent) over a 14- to 17-year period after the start-up of the joint project in 1994. The scope of this agreement goes well beyond the framework of an advance sale, since it closely associates the two companies in the design, engineering, construction and operation of the production facilities for condensates and liquefied petroleum gas. Furthermore, the agreement provides for the creation of an international joint venture for the marketing of LPG, and this corporation may deal not only in LPG from Hamara but also in "new markets."

Sonatrach is currently holding discussions with several consortiums with a view to signing similar agreements. It is expected that agreements will be signed by the end of 1991, with work beginning between 1992 and 1994. The "partnership" associations under negotiation concern 66 Mt of condensates and 74 Mt of LPG, and should cover a period extending up to the year 2010 (*Bulletin de l'Industrie Pétrolière*, 1991b; *Pétrostratégies*, 1991b), while Sonatrach's plans as a whole involve 11 deposits containing 95 Mt of condensates and 160 Mt of LPG.

THE VENEZUELAN APPROACH: "INTEGRAL COOPERATION"

Since the amendment of Article 5 of its constitution in early 1990, Venezuela has authorized the participation of private companies in exploration and production activities. The Minister of Petroleum points out that this action represents neither a return to the concessions system that prevailed prior to nationalization, nor a form of service contract, but rather involves the establishment of new joint-venture companies to take advantage of high-risk opportunities. These companies will not own the oil in the ground, which will remain the property of the state; but they will have the right to extract it in exchange for royalty payments and to dispose of it afterwards (*Petroleum Economist*, 1990). This more open approach has been translated into several specific agreements. For example, the March 1991 agreement in principle between PVDSA and ELF sets objectives for both the upstream and downstream sectors. In the upstream sector, the objective is to establish a long-term strategic alliance between the two parties with respect to new exploration zones in Venezuela and to the production and processing of heavy and extra-heavy crude (*Bulletin de l'Industrie Pétrolière*, 1991a). In the downstream sector, cooperation will involve the refining and distribution of petroleum products in France and Europe, refining technologies, optimal crude supply arrangements, and the marketing of products. By mid-1991, PDVSA had signed similar agreements with BP, ENI and Veba, and discussions were under way with Total.

12/ Before the Gulf crisis, Iraq was about to announce at least two major agreements with foreign firms, and it was negotiating for the development of at least six other discoveries (*Petroleum Intelligence Weekly*, 1990). Because these developments have been thoroughly overshadowed by the 1991 war, there is little that can currently be said about these initiatives.

THE IRANIAN APPROACH: "GENERAL COOPERATION"

Iran's stated objective is to reconstruct its production and export capacity through agreements with foreign firms. The government forecasts an expansion in production capacity from 3.5 to 5 Mb/d by 1993. Tehran is prepared to offer long-term crude oil sales contracts on "favourable" terms to companies willing to invest in exploration and development. These agreements concern existing undeveloped deposits. Since "concession" or production-sharing agreements are forbidden by Iranian law, and are therefore out of the question, new types of agreements are envisaged. The letter of intent between NIOC and Total gives concrete expression to the various negotiations between these two partners. This agreement sets out arrangements "based on a general approach" concerning: 1) the development of offshore oil fields, chosen by common agreement; 2) the marketing of large quantities of Iranian crude; 3) appropriate pre-financing arrangements through a consortium of banks; and 4) prospects for an Iranian LPG development project (*Bulletin de l'Industrie Pétrolière*, 1991c; *Pétrole et Gaz Arabes*, 1991b). A similar letter was recently signed in September 1991 by NIOC and Japex concerning: 1) exploration of an offshore zone, with all risks and costs to be assumed by Japex; 2) development by Japex; 3) remuneration in the form of a service contract and crude oil in accordance with a formula similar to a production-sharing contract (*Pétrostratégies*, 1991d). Negotiations are also under way with BP, Agip, Chevron and Elf.

THE SAUDI APPROACH: CRUDE SUPPLY AGREEMENTS

Saudi Arabia continues to limit access by foreign firms to its oil reserves. Negotiations with several oil companies (notably Japanese firms) aimed at accelerating the development of oil reserves and exploring new supplies in exchange for commercial joint-venture agreements have not yet produced formal agreements. A letter of intent was signed by Saudi Arabia and Total in March 1991 to initiate negotiations on potential cooperation in the European downstream sector.[13] It was agreed that in the anticipated final agreement, Total would not receive concession rights but rather a very long-term contract, guaranteeing the supply of crude to a Franco-Saudi joint venture set up expressly for this purpose (*Pétrostratégies*, 1991a).

While the boundary between cooperation-partnership and cooperation-domination is not always clear, new practices are being developed. Innovative agreements and the experience accumulated by both categories of partners are resulting in more open access to reserves and to production under new, pragmatic terms. Although details are still sketchy, solutions appear to have been found to the dilemma facing crude-short western countries in their dealings with the governments of producer countries for whom the granting of ownership rights over their reserves to foreign companies is still a very sensitive issue.

In many situations, for reasons that have to do with the desire and capacity for autonomy on the part of producing countries, alliances are struck for a limited time, in the course of which each party's contribution to the common project changes. There has been a recognition of what we and others have called "cooperation-partnership." To achieve this goal, leading exporters will prefer to interpret existing legislation more freely, or even to circumvent or disregard it, rather than change oil legislation passed in the 1970s.

For their part, western multinational corporations now face a situation in which the balance of power has tilted more in their favour. Today, many elect to refuse offers of service contracts because they have the opportunity to gain access to hydrocarbon deposits through production-sharing contracts.

* * *

Given the dynamics of these cooperation agreements, the second-tier producing countries are likely to remain dependent, and increasingly so, on the multinational corporations. This possibility is most likely to occur where those holding legal sovereignty over natural resources are, be-

13/ In an interview with *Le Monde* on June 28, 1991, the CEO of Total commented: "Saudi Arabia is seeking its path. They are very mobile, so are we" [translation].

cause of their size and the obstacles they face, incapable of initiating the learning process leading to control over their resources.

2.2 Promises and Uncertainties of Cooperation with the Former Soviet Union

To date, the most significant petroleum issues in the former COMECON concern relations with the former Soviet Union, estimated by *World Oil* to have reserves totalling 60 billion barrels, and Romania, believed to have one-fiftieth this amount. Both have declared their interest in cooperative ventures in the upstream petroleum sector. Table 5 lists the main joint-venture agreements that were signed or were under negotiation in the Soviet Union prior to its break-up in late 1991.[14] Almost all appear to conform to the model of exploration and production contracts, with a probable sharing of risks and costs. The remainder, which involve feasibility studies, are more similar to service contracts. But recent examples, such as the agreement concerning the huge offshore gas deposit in the Barents Sea, indicate that when the results of these studies are positive, new development contracts follow.

These agreements raise two questions:

- What are the chances of success or failure of these initial projects?
- Is a much more active role for western companies in this country foreseeable?

Indeed, the apparent proliferation of such agreements, which reflects the interest aroused in western companies by the prospect of access to such promising petroleum reserves, could mislead observers into concluding that the pace of change will be rapid in the short and medium term. This would be to ignore the current and foreseeable difficulties involved in the transition to a market economy. Western experts, economists and political analysts all agree that this transition is unlikely to proceed smoothly without major disruptions, as was confirmed by the attempted coup on August 18, 1991. The breakup of the former Soviet empire which these events precipitated is now a reality.

The future direction of relations with the Soviet oil industry will depend on an effective restructuring of the industry and the formulation of legal rules defining a framework for the activities of foreign companies.

The previous system, already complex, has been made even more confusing by an increase in the number of decision-making units and conflicts among the republics. This has made the process of authorizing and implementing projects more cumbersome and uncertain. Table 5 lists an impressive array of actors that have signed joint-venture agreements. One of the difficulties encountered by company negotiators has been to identify the proper Soviet and Russian interlocutors, given the predominant share of major hydrocarbon deposits located in the Russian Republic. The worsening conflict between ethnic/national groupings within the Russian Republic exacerbates all of these problems.

The framework governing the activities of foreign companies is itself vague. It will be necessary, at minimum, to define and implement rules governing such matters as accounting and tax standards, wage agreements, customs facilities, currency transfers, etc. However, many of these rules are emerging or will emerge from many reforms under discussion or in the early stages of implementation.

But clarifying these matters will not cause all nationalist sensibilities to disappear. There is particular concern about the risk of foreigners exploiting — even pillaging — the country's wealth. The criticism directed at the Chevron project now under way in Tenghiz in the Republic of Kazakhstan attests to this sensitivity (*Pétrostratégies*, 1991c).

On the whole, many uncertainties remain for the oil companies; the situation is still chaotic, with tensions rising and few prospects for short-term solutions in sight. However, oil, along with gold, is one of the few commodities that is solvent on the international market. Western com-

14/ While this paper has been updated in December 1991 to account for the most obvious developments in the formerly planned economies, note that the detailed information reported on was collected during or before Summer 1991.

Table 5: Main Joint Venture Agreements for Exploration and Production between Western Companies and the Soviet Union (as of mid-1991)

Foreign Company	Country	Soviet Partner	Location	Republic	Activity	Date
Chevron	US	Ministry of Oil & Gas (M.O.G.)	Tenghiz (Kazakhstan)	Kazakhstan	Exploration-production contract (E.P.C.)	06/90
SNEA	France	M.O.G., Ministry of Geology	Volga/ Caspian	Russia	E.P.C.	05/90
TOTAL	France	Ukhtaneftegaz-geologia	Timan-Pechora	Russia	E.P.C.	12/90
TOTAL	France	Ukhtaneftegaz-geologia	Tartary, Romashkino Field	Russia	Sale of technology and tertiary recovery	12/90
AMOCO	US	GAZPROM	Western Siberia	Russia	Feasibility study for the development of deposits (F.S.D.D.)	09/90
CONOCO	US	Arkhangel'sk geologiya	Timan-Pechora	Russia	F.S.D.D.	09/90
CONOCO	US	Tyumenneftegaz Tyumengeologiya Noyabrskeneftegaz	Western Siberia	Russia	F.S.D.D. for Kharampur and Sugmut exploration contract	09/90
ARCO	US	Governments of Chukotka and Magadan	Far East	Russia	Development of onshore and offshore fields	12/90
AGIP	Italy		Timan-Pechora (under negotiation)	Russia	Development of a heavy oil deposit	
AGIP	Italy		Pre-Caspian basin (under negotiation)		Development of a sour gas deposit	
CONOCO Norsk Hydro Neste Oy Oy Wartsila Imatra Voima Oy	US Norway Finland	Ministry of Oil & Gas (M.O.G.)	Barents Sea	Russia	F.S.D.D. for the Shtockmanovskoye deposit	04/90
AMOCO UNOCAL/BP /STATOIL	US GB Norway	Kaspmnor-neftegas	Caspian Sea	Azerbaijan	Development of the Azeri deposit	06/91
PANOCO	Switzerland	Tatneft	Republic of Tartary	Russia	Development of seven oil deposits	03/91
MUSTANG INVEST.	US	Nizhnevart-ovskneftegas	Western Siberia	Russia	Production and marketing of hydrocarbons	01/91
PETRO-HUNT	US	Yugansk-neftegas	Western Siberia	Russia	Oil prospecting	06/91
Sakhalin Oil Develop.	Japan		Sakhalin	Russia	Exploitation of oil/gas resources	negot.

Source: O. Trouvé (1991) and C. Locatelli (1991), *Bulletin de l'industrie pétrolière*, various 1991 issues.

panies thus have the option of circumventing the banking system for a portion of their transactions and recouping their current expenditures and investments by remuneration at the border in the form of a share of the crude produced by the joint ventures. However, this option still assumes that several other conditions are satisfied:

- the existence of a basic transportation and logistics system to supply the drilling fields with equipment and products, Soviet or imported;
- a means of transporting the crude from the production site to the export point;
- agreement on the accounting of costs/expenses in a period of probable high inflation, changes in relative prices, and devaluation of the ruble against western currencies.

This uncertain socio-economic environment consequently presents a very high level of short-term risk for western companies. This may explain, at least in part, why the largest private companies (RD Shell, Exxon, BP) have not yet fully committed themselves and why the level of commitment of the other companies remains modest. Many have formed consortiums to share the risks. They will likely be willing to make a stronger commitment once the institutions have been stabilized, and all partners have learned more about cooperation.

For the immediate future, operations by western companies in the former Soviet Union appear to be limited to pilot projects, which will likely be followed by operations on a much larger scale. The effects of these companies' operations on Soviet oil production will probably not be felt for about 10 years.

3. Conclusions

The conditions governing access to oil deposits are major determinants of the structure of any international petroleum order. The resulting relative geological advantage for each oil company largely determines the range of its strategic options. Up to a point, the multinational companies seem to be in a position to offset their comparative geological disadvantage with other competitive advantages.

But when the opportunity again arises to gain access to large-scale petroleum resources, they quite logically seek to exploit it through various forms of contractual arrangements. The companies of the producing countries may decide to modify, at least indirectly, the rules governing access to their crude resources in favour of their international competitors in order to benefit in return from the latter's competitive advantages. That is what has been happening since 1989.

Combined with the process of downstream reintegration by producing countries, the changes in conditions of access to oil reserves, and therefore in the strategic options open to oil companies, appear to open up a new perspective in the history of this industry — a degree of reunification at the world level.

In the context of this new cooperation-based petroleum order, the problem of renewed western dependence on the reserves of the Middle East (Criqui, 1991) is posed in new geopolitical terms. By reducing the political vulnerability of imports from these regions by virtue of the mixed character of the operators developing the deposits, "cooperation" enhances the geological attraction of these prolific zones in the future world oil supply system.

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