On Oil Price Concepts

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INTRODUCTION

What do people mean when they refer to the "world price of crude oil"? What do they really mean when they state that "the price of oil has risen" or that "it has come down"? There are many different concepts of the price of oil, a term which can be deceptive in its apparent simplicity.

Different price concepts have come to be used at different periods in the eventful history of oil; and different price concepts apply to transactions effected at any given point in time, transactions which sometimes involve the same buyers, the same sellers and the same crude variety.

In the 1950s and 1960s the visible prices of international crude oil, then termed "posted prices", were not really prices in a clear economic sense. In the 1970s and in subsequent years up to the present the visible prices of international crude oil have carried many a different label. Some of these prices are adminstered by OPEC or by other oil-producing governments, and others are determined on spot or contract markets. Today the stage seems to be occupied by two rivals, a so-called "Market Price" and a so-called "OPEC Price"; but these are simplified notions, convenient and therefore misleading catch-all expressions. In reality there is a whole array of OPEC prices, not all of them rigidly administered; and a whole array of market prices, not all of them purely determined

by market forces. And the two rivals on the stage never act their parts independently of each other.

Oil price concepts are often expressed in ways which do not immediately reveal their real economic meaning. For example, we shall find that some price concepts are in fact fiscal concepts, and that some cost concepts tell us more about prices than certain prices taken at face value. Oilmen, being practical people more concerned with operational objectives than economics, and oil commentators, being media people sometimes more impressed by effect than substantive meaning, unwittingly add to the confusion by loose or misleading use of the terms.

The interpretation of oil price concepts varies for another, more fundamental, reason. Prices are looked at from different angles by the various parties in the oil game. For an exporting country price is something which relates to unit revenues. It is not surprising that prices and taxes should get so mixed up in the world of oil. For the oil-importing country the price which matters most is the c.i.f. import price because of the balance-of-payments burden, while the final consumer (household or firm) is essentially concerned with the price of petroleum products in domestic markets: the petrol price at the local service station, the price of heating oil delivered to plants, offices or homes, or the price of fuel oil purchased by industry or by the utilities. But the international and the domestic prices of petroleum need not move together, since they are effectively decoupled by (a) hefty domestic taxes levied by most governments on oil products and (b) by exogenous movements

in exchange-rates. For companies, which tend to use a different language, the focus is primarily on margins. Clearly, price changes do not have the same significance for these various groups and when governments, companies and consumers talk about the price of oil, they sometimes refer to, and they always express concern about, very different things.

Prices are allocative signals, but changes in oil prices also have considerable distributional and macro-economic effects. In the 1950s and 1960s the problem of intertemporal allocation of oil resources was rarely raised[1] because there was no perception of future scarcity. The distributional issue worried oil-exporting countries because they were unhappy with low prices, depressed unit revenues and lack of control over products on decisions. Further, as arms-length transactions in international oil (outside the US) were few and far between, it was difficult to seek allocative signals from markets; hence the emphasis on taxes, acquisition costs and accountants' prices.

In the 1970s things were reversed. Income transfers and the associated macro-economic effects were the big issue for oil-importing countries. Before 1973 exporters judged their receipts to be low and their economic development to be retarded by lack of funds. After 1973 importers felt that they were paying too much for oil and that their economic growth was the victim of price shocks.

Yet a new interest in allocative issues emerged during the 1970s. The first price shock created a perception of scarcity and a feeling of insecurity in importing countries; hence a concern with depletion (ie intertemporal allocation of

oil resources over the long period), and substitution, (ie re-allocation of energy uses to different fuels in the short and medium term). The second price shock was followed by a contraction in oil demand, hence a concern on the part of producing countries with the relationship between prices and their share of world energy supplies. Further, the markets for international oil, which had already been established on a small but expanding scale in the 1950s and 1960s, began to develop faster in the 1970s. Today there are spot markets which play a significant role, short-term contract sales outside integrated channels, and futures markets which have just started to blossom. As there are oil prices which seem to reflect the interplay of market forces, there is naturally much talk about allocation.

The purpose of this paper is to review the various price concepts relating to **crude oil in international trade** in order (a) to assess their economic meaning, (b) to interpret the different roles which each concept attributes to the price it defines, and (c) to establish the relationships between these various price notions.

As the interpretation of an oil price concept often depends on the characteristics of the institutional system (markets and institutional agents) in which the concept evolved, we shall make constant reference to the relevant historical developments, without however providing a full historical account.

The multiplicity of price concepts is often associated with the existence of two-tier (and in some cases multi-tier) pricing systems. There were times when OPEC had two reference

prices - a deemed and an actual marker; and most of the time crude oil is purchased at both official and market prices. Multi-tier pricing is an important but as yet little explored characteristic of the world petroleum market.

This paper is a necessary preliminary for work on more substantial price issues: the politico-economic question of how oil prices are determined, and the statistical question of how different oil price series (including price differentials) relate to each other.

POSTED PRICES AND TAX-PAID COSTS

The Old Oil Concession System

Before 1973 the concepts of POSTED PRICES and TAX PAID COSTS were commonly used in relation to the liftings of oil companies from oil-exporting countries. These concepts are still applicable today in specific and much narrower instances.

Posted Prices, in certain contexts, still express exactly what the words mean: the prices which a seller or a buyer makes public in some conventional way to give notice that he is prepared to accept or to offer a certain sum for a barrel of crude oil or a tonne of petroleum products. In some markets companies still post the prices at which they are willing to sell some refined product; and in the US some refiners post the prices at which they are willing to buy a barrel of crude oil.[2]

In the old concession system which prevailed in the OPEC region until the early 1970s, posted prices were initially used to indicate a company's selling price. The introduction of a fiscal regime involving an ad valorem royalty and a tax on notional profit per barrel produced gave posted prices another function. They were used for the calculation of these taxes. No other price concept - such as SPOT PRICES or LONG-TERM CONTRACT PRICES - would have been suitable. At that time spot

transactions were few and far between. These sparse transactions were not well reported and it would have been impossible, with all the goodwill in the world, to extract from the spot market of the 1950s and 1960s the numbers required for tax purposes. Contract prices were not published. They were embedded in clauses of long-term trade agreements between major oil companies or between major oil companies and third parties. The oil companies considered them as very important commercial secrets that should not be divulged lest rivals used the information to devise adversary pricing strategies; and oil-exporting countries were not particularly keen to use contract prices in tax formulae because they knew that they were often lower than posted prices. There was no real option but to use posted prices.

The formulae designed to calculate the government take per barrel (T) are given below. Until the mid-1960s the unit tax was conceived as a share of notional profit (ie the difference between the "price of oil" and some estimate of the average costs of production). Royalties paid by companies under concession agreements were set against this tax. This means that the tax liability per barrel was simply the profit tax:

$$\text{thus} \quad T_1 = (P - C)s + Pr - Pr$$

$$\text{or} \quad T_1 = (P - C)s \qquad (1)$$

where P is the posted price, C the estimated cost of production per barrel, $s(0<s<1)$ the tax rate on notional profits, and $r(0<r<1)$ the royalty rate.

In 1964, after long and hard negotiations OPEC reached an arrangement with oil companies under which royalties were (a) treated as a cost in calculating the "profit" tax and

(b) paid in addition to the profit tax. This arrangement known as the expensing of royalties was OPEC's first bargaining achievement with the oil companies;

$$\text{thus } T_2 = (P - C - Pr)s + Pr$$

$$= (P - C)s + Pr(1 - s) \qquad (2)$$

Clearly $T_2 > T_1$ since $s<1$ and $Pr(1 - s)>0$. In fact expensing means that a share of the royalty, $Pr(1 - s)$, is paid on top of the profit tax, $(P - C)s$. Under the conventional fifty-fifty arrangement which prevailed in that period, we had $1 - s = s = 0.5$. Rather amusingly, this change meant that companies paid in tax per barrel half the notional profit plus half the royalty. The expensing of royalties could be seen as a straightforward extension of the fifty/fifty principle to prices, costs and royalties. It was fifty/fifty throughout!

Consider formula (2) again. With s (the tax rate on notional profit) and r (the royalty rate) conventionally fixed, and with C treated virtually as a constant, T simply becomes a linear function of P

$$T_2 = aP - b \qquad (3)$$

With $a = s + r - rs$ $(a>0)$ and $b = Cs$ $(b>0)$.
Further, C was small relative to P, typical values in the 1960s being \$0.10 and \$1.80 respectively. It follows that any change in P virtually leads to a proportional change in per barrel tax. Under this system one could say that P for all practical purposes was an analogue of T.

Prices used as numbers in fiscal formulae tend to become something other than prices. Both governments and

companies became mesmerised by the effect on the tax T of any movement in prices, whether caused by the normal operations of market forces or by some outside interference. This polarisation on T makes the posted price less responsive to the usual forces of supply and demand and to the perceptions and bids of buyers and sellers.

The oil-exporting countries were in effect tax farmers and the companies were tax payers, and this particular relationship provided the framework of oil price administration. A transaction price subject to the influence of market forces would inevitably go up and down, but a posted price, which can only be changed through bargaining between tax farmers and tax payers, may well remain frozen for fairly long periods. The tax farmer, however keen on higher revenues, may not be strong enough to impose a rise on the reluctant tax payer; and the tax payer, given an opportunity to bargain for a lower "posted price" may still prefer to forego the benefits of reduced payments in order to avoid the tax farmers' antagonistic reactions in the distant, yet insecure future.

This is precisely what happened during the 1960s. The oil companies took note of the fact that OPEC was established in anger, in response to successive reductions in posted prices, which affected pari passu the government's per barrel take; and though they did not consider OPEC to be a dangerous force they preferred not to push their luck. Il ne faut pas tenter le diable! To ignore requests for upward revisions of the posted prices is one thing; to bring the posted price down is something else. The former is a sin of omission which the companies were

prepared to commit, the latter a sin of commission which they were not. But this restraint was not pure virtue. The oil companies, more precisely our "tax payers", happened to be multinational corporations with fiscal liabilities in different countries. They enjoyed the benefits of allowances for double-taxation which enabled them to treat payments made to oil-exporting countries as tax credit in their own countries - namely the USA and the UK. To keep posted prices fixed when their short-term commercial instincts suggested the need for a cut meant that they paid more taxes to the exporting countries than they would have done at the lower price; but this did not necessarily mean a higher worldwide tax liability.

The irony is that in the late 1950s the major oil companies themselves created the conditions conducive to the formation of OPEC by trying to expand third party sales of their surplus production by lowering posted prices. Of course, they could have lowered their contract prices to the third parties and left posted prices (the basis for computing producers' revenues) unchanged; but they did not. The oil company "cartel" played competitive market games and in doing so it lost cohesiveness and, unwittingly, helped the emergence of another "cartel" - in fact, a defensive association of exporting countries.

The main consequence of this episode for our price story is that the weak link between posted and third party or long-term contract prices was finally severed. Throughout the 1960s, posted prices remained rigidly fixed while other prices, as far as one can ascertain, were subject to some movement. We

can now see how posted prices ceased to perform as allocative signals. Distributional considerations, related to their sharing out of the oil rent between exporting countries and companies, and fiscal considerations, related to their role as transfer prices for tax credit purposes, weighed heavily in their determination. And to refer to distribution is to hint at the importance of political factors.

In the oil world of the 1960s the "distributional" function of P superseded, and almost abolished its allocative role; the tax farmer and the tax payer occupied the centre of the stage; the buyer and the seller were on the same side of the market, merged into a single entity - the vertically-integrated, oligopolistic oil company. Oil-exporting countries, save one or two, were concerned primarily with revenues (distribution) and their worries about the price of their depletable oil often stemmed from revenue rather than allocative (whether cross-sectional or intertemporal) considerations. The oil companies believed that the only allocative price that mattered was that of oil products in final markets (though this price was itself distorted by excise taxes, imposed at various rates and in differential ways according to products by the oil-consuming countries). Their views about allocation were strongly influenced by short-term considerations stemming from open competition on the main product markets and from less conspicious competition on the third-party market for crude.

To sum up. In the 1960s the posted price concept finally became a pure fiscal concept. Initially P, administered by an oligopoly with an eye on the market, was meant to determine

the actual values of T. P was the prime-mover and the unit-tax revenue of governments, the dependent variable. Later on, or more precisely as soon as OPEC was established, T became the determinant of the posted price. The need to keep T fixed - the outcome of a bargaining stalemate - meant that P had to remain fixed. And later, when governments bargained for a higher T and obtained some satisfaction, P had to be raised accordingly. In short T became the prime-mover.

This "fiscalisation" of the price was not the cause but, rather, a revealing symptom of the state of affairs prevailing in the 1950s and 1960s. The roots and causes are to be found in the structure of the industry, the peculiar characteristics of oil as a commodity, and the balance of power between host countries, concessionaires and the powers backing the major oil companies.

Tax-Paid Cost. If posted prices tell us nothing about markets outside the integrated industrial structure and nothing about the cost of crude within the system, the need for some other concept necessarily arises. Analysts wanting to assess the acquisition cost of crude for an integrated company operating a concession or involved in a joint venture in exporting countries had recourse to the simple accounting notion of direct outlays. The concessionaire spent C dollars extracting and handling a barrel of oil as far as the export terminal in country A and then paid T per barrel to country A. The tax paid cost per barrel therefore is $Z = C + T$. Referring to formulae (1) and (2) we have:

$$Z_1 = T_1 + C = Ps + C(1 - s) \qquad (4)$$

and $Z_2 = T_2 + C = Ps + (C + Pr)(1 - s)$ (5)

Since s is the government's share of notional profits and 1 - s is the company's share, Z can be interpreted as the sum of a government's share of prices and a company's share of expenses. If s = 0.50, as was indeed the case for a fairly long period, Z becomes equivalent to half the notional price plus half the expenses (costs plus royalties). This illustrates in a graphic way the non-price nature of the tax-paid cost concept; it is typical of familiar accounting conventions which say "assume that you bear such or such proportion of certain items" (read in this context, the price that I am supposed to have paid and the costs of extraction and the royalties that I have actually incurred). Looked at in a different way, Z tells us that the concessionaires, in compensation for their exploration, development and production effort acquired oil at half the posted price and were reimbursed half their expenses.

The alternative accounting concept is the TRANSFER PRICE which a vertically integrated company records in its books as the deemed price of a transaction between subsidiaries. But transfer prices need not reflect economic prices or acquisition costs, as they often simply reflect the accountant's ingenuity at minimising the worldwide tax liability of a company, taking advantage of complex legal stipulations about tax credits, fiscal allowances, double taxation agreements and the like. Cases where transfer prices are used within a vertically integrated system for allocative purposes do exist but are very rare indeed.

Of course, the meaningful economic concept is that of

OPPORTUNITY COST. If we ignore inter-temporal factors, this can be defined as the lowest price at which a company can acquire an incremental barrel of oil from an alternative source. In the world petroleum industry of the 1950s and 1960s the alternative sources of shipments from a concession in the OPEC region were (a) some other concession in the OPEC region, where the same tax rules applied, (b) Soviet exports, (c) the odd distress cargo sold on the spot market when an oil company had made some irreparable planning error, or (d) third party sales. A major oil company, save for the odd purchase here and there, would normally get the additional barrel from its own concession (for an outlay of Z), or from a sister company operating another concession (for an outlay of Z + δ, where δ is a trading margin).

In the case of major oil companies, Z, being the cheapest alternative, can be taken as an approximation of the opportunity cost; and one can easily understand why analysts used tax-paid cost both to measure "accounting" acquisition costs, and to express "economic" opportunity costs. However, one should recall that "independent" companies operating in Libya were able for a short while to acquire oil at a lower tax-paid cost than the majors, because they were allowed to compute the tax on the basis of realised instead of posted prices. Elsewhere, some newcomers (eg ENI) tried to break in and obtain a concession in regions dominated by the majors by offering higher tax payments per barrel. Finally, those refiners and companies relying on third-party contracts for their crude supplies would usually have paid something approaching the contract price for the incremental barrel and we know that this

price was always higher than Z.

Thus the opportunity cost of the marginal barrel varied from one type of company to another. We should also note that the opportunity cost for the owner of the resource is something else again, because depletability, which is of much greater concern to the owner than the concessionaire, introduces the problem of inter-temporal allocation. A barrel of oil produced today is an opportunity foregone for production at some future date. The oil company may ignore this aspect because uncertainty about the future of the concession implies a high discount rate; the oil country may not because its concern about future economic development entails a low discount rate. Once the inter-temporal dimension is introduced, the opportunity cost of oil cannot be defined by Z or by an approximation of that number. Nor can it be defined for that matter by the marginal cost of extraction C.

Taken at face value as an actual measure of acquisition costs the tax-paid cost concept had its use. It could be compared with other prices (spot or contract) which may have come into existence from time to time. It is worth noting that tax-paid cost usually turned out to be smaller than posted prices. This can be proved as follows: $C + Pr < P$ when $C < P(1 - r)$. Since C was of the order of 0.05 to 0.1P and r fell in the range of 0.125-0.200, the condition for $Z < P$ was comfortably satisfied. An oil company using Z as the transfer price of crude within its vertically integrated channel would attribute much smaller profits to its upstream operations than if it used the posted price P. (In a sense both Z and P are arbitrary ways of

determining transfer prices, but accountants could justify the use of either on the grounds that these are recognisable numbers). One can but assume that companies generally favoured the posted price as it would be difficult otherwise to explain the companies' view that oil profits were made upstream. The major oil companies during the pre-1973 era held this view with the faith and fervour reserved for dogmas. Of course these beliefs are terribly misleading, because the internal attribution of integrated profits to upstream and downstream operations is inherently arbitrary when made through the device of arbitrary transfer prices.

BUY BACK PRICES

Participation Agreements and the Demise of the Old Concession System

This story has its origins in the late 1960s when governments of some OPEC member countries began to claim a participation share in the ownership of firms operating oil concessions - eg Aramco, KOC etc. In those days, Saudi Arabia was leading the demand for government participation, a fact worth recalling as an antidote to simplistic but widespread views on the moderation or militancy of this or that OPEC country.[3]

Initially, the so-called "moderate" OPEC countries asked for 25 per cent participation rising to 51 per cent over a ten year period. But perceptive observers felt that the eventual objective was a 100 per cent target, that is complete nationalisation (with appropriate payments for the acquisition of the operator's assets). In some instances participation proceeded in steps from 25 to 60 and then 100 per cent equity holding; in other cases nationalisation was effected from the start. Yet some companies in Nigeria, Libya and the UAE still hold an equity interest in the concessions today.

Participation gave governments a share in current production equal to the proportion of the equity held. There was

no division of profits, no distribution of dividends, but an apportionment of both output and costs. The system is akin to a farming partnership, where two farmers cultivate together a plot of land and share both costs and produce in some agreed proportion.

Participation led to the introduction of new price concepts. First, governments had to set a price for the sale of their own oil to potential third party buyers. Thus entered the notion of an OFFICIAL or a GOVERNMENT SELLING PRICE (OSP or GSP in the literature) about which much will be said in subsequent sections of this paper. At the beginning, these governments' or national oil companies' sales to third parties (save for some barter trade with Eastern Europe) were either negligible or non-existent, but their significance grew rapidly in the second half of the 1970s. Yet participation made them possible in principle, hence the need to define a sales price. This was first done on the basis of postings with GSP set at 0.93P.

Secondly, governments found it both convenient and necessary to sell their own oil to the very companies which produced it on their territories. The buy-back transactions were convenient because oil did not have to change hands; they were necessary because governments did not at first have the marketing agencies required for selling oil to other customers. Thus governments made buy-back arrangements mandatory and conceived them as an essential component of the participation agreements. These buy-back provisions called for the introduction of a new price concept; thus entered the BUY-BACK PRICE.

At first participation caused some chaos in the oil price structure. There was much confusion and some disorder throughout 1974, and the interpretations in the literature on that period, despite Ian Seymour's lucid account[4], are as confused as the situation described. An oil company with interests in a concession would acquire some of its oil at tax-paid cost (see above) and the remainder at the buy-back price. Governments, or their national oil companies, would sell very small amounts at official prices. These were supposed to be fixed in close relationship to the prices realised by companies either in the narrow (but by 1974 economically significant) spot market or in their secretive (but by 1974 well spied upon) third-party contracts.

These realised prices could be interpreted as the price at which oil changed hands in external markets. But in 1974 realisations were much higher than tax paid cost, and governments of OPEC countries naturally became concerned about the very large margin enjoyed by concessionaires. Concessionaires could easily afford to compete with governments trying to sell to third parties at official prices and to undercut these prices since they had access to cheaper oil from the same source.

The interesting point is that a concession system in a slack market cannot really co-exist with direct government sales unless the acquisition cost to the concessionaire (including a margin for "normal" profit on its operation) is equal to the official sales price. For the system to work tax-paid cost

should be set as follows:

$$Z = GSP - m \qquad (6)$$

Further, the buy-back price should be equal to GSP since the concessionaire incurs no cost of production on government oil. In practice, if all government oil is bought back then it is simpler to set the buy-back price at GSP - C and let the operating company cover all costs.

Thus, the simple equilibrium condition is that the government receives GSP per barrel of its own equity crude (whether sold to third parties or to concessionaires) and GSP-(C+m) per barrel of company's equity crude. The net income per barrel for the government in all cases is GSP - (C+m) since the government covers the cost of production C of its own crude and since the profit margin m on government equity oil can be treated as the opportunity cost of invested capital.

Similarly, the oil company will always acquire oil at GSP whether it obtains it through direct sales (GSP), buy-back arrangements (GSP - C + C) or through the concession (T + C + m = Z + m = GSP). Here again the profit margin is treated as the opportunity cost of invested capital.

There are, however, some difficulties relating to this profit margin m. Theoretically, the concept of normal profit is always troublesome as it involves a number of simplifying assumptions which severely restrict its significance. In practice it is difficult to choose a value for m on which governments and companies can agree. There have been cases where companies claimed that the margin was totally inadequate and backed their claim by reducing liftings of equity crude. In other

instances the margin conceded by governments was too large. When demand for oil is slack governments are often tempted to concede a higher margin, but this is not justifiable economically (in terms of the equalisation principle). Clearly, the increased margin is thinly disguised price cutting destined to increase export volumes on a dwindling oil market.

In fact, the conditions stated above for the equalisation of acquisition costs only hold when the market is in equilibrium (no excess supply at the given price). In a situation of excess supplies the equity margin should be set at zero for companies to be indifferent as to whether they lift their own or government oil. The economic rationale for setting m at zero is that there is no return on capital at the margin when excess capacity prevails. If the market is slack and a positive equity margin m is conceded, companies will have an incentive to lift their equity oil first, up to the maximum allowable, and will turn to other sources only for residual supplies. As mentioned earlier, and for obvious reasons, governments tend to do the opposite when the market is slack, raising the equity margin conceded to companies instead of lowering its value.

It took OPEC governments a year or so (the best part of 1974 through to the beginning of 1975) to rationalise the pricing system in terms of simple equilibrium conditions. If 1974 is so confusing for the price analyst it is because governments retained the cumbersome arrangements involving posted prices, notional profit taxes and royalties for company crude, while

introducing GSPs and buy-back prices for their own oil. During this transition year they gradually tried to raise taxes in order to bring Z into equality with GSP - m.

Since $Z = Ps + (C + Pr)(1 - s)$,

and $GSP = \alpha P$ with $0 < \alpha < 1$,

the attempts to make $Z = GSP - m$ or $Z = \alpha P - m$ would involve changes in the royalty rate r, the notional profit tax rate s, the posted price P or the co-efficient α. Some governments tried all these methods, and they naturally met resistance from the companies.

This approach to the unification of the price structure was clumsy enough. Some governments adopted a different, and no less clumsy, approach. They tried to equalise the <u>average</u> acquisition cost of crude for the concessionaire so that

$$(1 - a)Z + aB = GSP - m \qquad (7)$$

where B is the buy-back price, and a the government's ownership share. This approach provided governments with a larger number of instruments to play with. When companies tried to resist a proposal to raise r or s, Governments threatened to raise their participation share a from say 25 to 60 per cent. They were also able to alter the buy-back price B.

The simplest solution, of course, was to abolish all the fiscal parameters (P, r and s) and to unify the cost/pricing system around GSP, in ways which conform to the equilibrium conditions expressed above. This started to happen in 1975. Government sales were ruled by GSPs and companies with equity holding paid the government for each "equity barrel" GSP less certain cost and profit allowances. There were some exceptions:

former concessionaires were sometimes allowed a "goodwill" margin or an over-generous service charge. This placed some companies in a favourable position vis-a-vis other companies. Nevertheless, posted prices, notional profit tax rates and royalties, by and large, made their exit from most of the OPEC region in 1975, and GSPs took the centre of the stage.

To conclude this section, it is worth commenting on the implications of participation. There is no doubt that the participation claim is at the origin of the significant structural changes which transformed the crude oil industry in the second half of the 1970s. Participation gave the governments of oil-exporting countries access to oil; and though they began by shying away from direct sales, taking refuge in buy-back arrangements, sooner or later they were bound to engage in trade with third parties. Participation heralded a new phase in the disintegration of the international oil industry, and it certainly significantly reduced the degree of market concentration. One could almost say, tongue in cheek, that through participation OPEC helped in the emergence of a proper world market for crude oil. The other factor, of course, is the growth of non-OPEC exports in the late 1970s which resulted from exploration and development decisions made several years before.

Participation would also have caused that revolution in the oil pricing system which replaced the bilateral (government and company) determination of posted prices with the unilateral (government alone) determination of official prices. Had governments had the time before October 1973 to get themselves

into the habit of fixing a price for direct sales of their crude, they would have ceased to tolerate bilateral negotiations on the posted price. But participation came too late and the events of October 1973 precipitated changes in the pricing system which participation would have brought about in any case a year or eighteen months later.

Many were irritated by the demands for participation made in the late 1960s but few understood their implication for the structure of the industry. As nobody believed that the oil-exporting countries would really try to manage their petroleum industry by themselves, participation was seen almost exclusively in terms of ownership, and its impact on the industrial structure was discounted.

In any case, the oil price revolution of 1973 cast its shadow over everything and attracted all the attention. It was indeed a major turning point. Yet the historian may now recognize that some of the seeds of long-term and perhaps irreversible changes had already been planted some years before: nationalisations, demands for participation and a search for new oil in OECD countries partly induced by growing uncertainty about the future of concessions. Prices go up and down but the structural transformation of the industry, a less volatile and more significant phenomenon, is there to stay for a long while.

OPEC PRICES

The Post-1973 Oil World

Introduction. There seems to be a fundamental pricing dichotomy in the world petroleum market of the late 1970s/early 1980s. Most analysts and commentators refer to two distinct sets of prices: those defined by OPEC and those which emerge in various markets. We shall see that the situation is more complex than that, involving a larger number of price sets, much interdependence and strong relationships.

OPEC prices are the GSPs of member countries. Other oil-exporting countries also have their own official prices, which relate in some ways to OPEC prices while remaining fairly responsive to market forces. It is sensible, therefore, to treat the official or term prices of non-OPEC exporters as a distinct set.

Market prices are determined in the various places where oil is transacted. For many years, until 1979, there was a significant third-party market where the majors supplied independent refiners with crude oil under long-term contracts. Today there is much trading between companies on short-term contracts or on the spot market for crude. There are transactions originating in oil-exporting countries involving premiums or discounts, barter arrangements or some special

concessions. In all these cases the price at which oil changes hands is generally different from GSPs. Finally, futures markets for crudes are now being established in New York, Chicago and London, a development likely to introduce new factors to the determination of oil prices.

There are different GSPs because there is a wide variety of crudes, each with specific physical, chemical and locational characteristics, and because exporting countries sometimes differ in their methods of price administration. There are different market prices, because of crude differentiation and because markets vary in their structure and functions. In all cases the reference to **an** OPEC or to **a** market price is at worst dangerously misleading, and at best too general to be of great interest. A more rewarding approach recognizes this diversity and seeks to identify important relationships between various price concepts.

The Marker Price. Let us now turn to the main subject of this section, OPEC prices. We may look at them as a subset of all GSPs (OPEC and non-OPEC), or as a group of their own which in turn may be divided into two subsets. The first subset consists of a single price, that of the OPEC marker crude which usually provides a reference to the whole price structure. The second subset includes all other OPEC GSPs.[5]

Thus, the concept to be defined here is that of the MARKER or the REFERENCE PRICE, which is the price of Arabian Light 34°API as determined by OPEC. The fact that the OPEC

marker is a crude actually produced and traded in very significant amounts by a member country - Saudi Arabia - has clear advantages because it provides the pricing system with a real standard. Inevitably this also gives rise to complications. To illustrate, let us note that the determination of the marker price brings into play two concepts of sovereignty:

- that of OPEC, which must adminster and be seen to administer what in effect is the only OPEC price;
- and that of Saudi Arabia, which must exercise and be seen to exercise full sovereignty over the price of its most valuable natural resource, crude oil, a variety of which also happens to be OPEC's marker crude.

There are instances when OPEC collectively, and Saudi Arabia as a sovereign member, agrees on a price for Arabian Light. Even then the negotiations and bargaining between OPEC member countries over what the price should be may involve complex twists and turns and subtle manoeuvres. Saudi Arabia often needs to make it clear - either by initiating the final decision or by dissenting with any consensus which may have developed outside its initiative - that the OPEC decision on the marker price is nothing but its own autonomous decision on the price of its oil.

But in other instances Saudi Arabia and the rest of OPEC have genuinely disagreed over the marker price. This happened as early as December 1973 and as recently as January/March 1983. Sometimes a compromise is reached. Sometimes - notably at Doha in December 1976 and at the Conference of Oil Ministers' meetings in 1979, 1980 and until

September 1981 - the disagreements have led to the emergence of a dual OPEC price reference structure. On these occasions OPEC insisted on fixing its price for the marker at a certain level, and Saudi Arabia on fixing its own GSPs for Arabian Light 34°API at a lower level. Thus entered the troublesome concept of the DEEMED MARKER PRICE (fixed by OPEC) to be distinguished from the ACTUAL MARKER PRICE (fixed by Saudi Arabia).

No transaction takes place at the deemed marker price. Its main operational purpose is to serve as a reference for the pricing of other OPEC crudes. In early 1977 and in 1979-81, when the dual price reference system prevailed, the actual marker was set below its deemed price. The economic consequences of this state of affairs are familiar:

(1) In a slack market, a shift in market shares in favour of the low-price supplier will occur. In a tight market no shift will obtain if every producer happens to operate at full capacity. But this is rarely the case. In 1979-80 Saudi Arabia let its oil output rise from the 8.5mbd allowable to a much higher level. Its market share increased.

(2) In a slack market countries which follow the deemed marker pricing rules may lose current revenues. But this is not a necessary outcome. Revenue losses only take place if the percentage reduction in exports exceeds the percentage difference between deemed marker and actual marker prices. Even then the economic losses may be smaller than apparent because oil that is not extracted today remains available for future use. The

present value of deferred output, however small, is likely to be greater than zero. The serious problem faced by high-price producers is not so much the immediate loss of revenue as the long-term loss of commercial goodwill on the part of their customers.

(3) In a tight market - as in 1979 and early 1980 - the dual price reference system inflicts a revenue loss on the low-price producer equivalent to the full price gap per barrel sold. Low prices do not induce increases in production because capacity (as determined physically or politically) is in any case fully utilised.

(4) The dual reference price system transfers income to buyers with a built-in access to the low-price source (eg to Aramco in 1979-80). It encourages corruption because the seller's agents are naturally tempted to appropriate for themselves part of the difference between high and low price. They will sometimes accept commissions, the polite term for bribes. The distributional impact of the dual price reference system in oil is both significant and widespread; once in existence it nurtures powerful groups with a strong vested interest in its perpetuation.

(5) In a slack market, the dual system encourages buyers with access to low-price sources to accumulate inventories. They speculate that the eventual compromise within OPEC between those who advocate high prices and those who favour low prices will be stuck somewhere halfway. All depends, of course, on the magnitude of the price rise, the rate of interest, the cost of storage and

the period of waiting.

Dual price reference systems tend to be regarded as abnormal, highly undesirable and dangerously distorting by OPEC member countries. They make nonsense of OPEC's claim of being able to achieve an orderly administration of oil prices in international trade. Their distributional impact is troublesome and causes strains. They seem to be as much disliked by those who may temporarily benefit from them as they are by those who happen to be adversely affected. As soon as a dual price reference system emerges, attempts are made to re-establish a unified price structure. In 1977 re-unification was achieved fairly quickly (within five or six months of the famous Doha meeting) because the leaders of the two opposing camps, Saudi Arabia and Iran, had good political reasons to compromise. The Doha pricing dispute did not leave deep scars on OPEC because the dispute was short-lived and the stakes, amounting to some 70 cents per barrel, were small.

In 1981 re-unification proved much harder to achieve. The oil price structure had lost all semblance of order since early 1979, and the rift between those countries committed to the deemed marker price and Saudi Arabia which used a lower reference price, was severe. The high-price exporters were reluctant to retreat because a lower price would have resulted in lower revenue per barrel. As demand for oil had already begun to decline they feared that total revenues would suffer from the compound effect of depressed demand and price reunification at the lower price.[6]. They argued against a compromise on the grounds that official prices should never be reduced. This is,

of course, a fallacy when applied to official prices other than the marker.[7]

Saudi Arabia was unusually heavy-handed during this episode. Whether its policies were a reaction to the stubbornness of the other group or a factor contributing to this stubbornness is a matter of fine judgement in which many subjective elements may enter. It all ended very painfully and very slowly in October 1981, in an unsatisfactory compromise. The actual marker price was raised by $2 and the deemed marker price reduced by an equal amount. The fifty/fifty criterion has clearly had more than one application in the long history of the oil industry!

OPEC Price Differentials. The second subset of OPEC prices includes all GSPs other than the marker. Crudes differ in quality (sulphur content, gravity, etc) and in the distance between export points and main markets. Crudes may have similar properties but are never identical, and these slightly imperfect substitutes naturally tend to fetch different prices.

In a market free of strong institutional interference the price of every crude would depend on own supply and demand conditions; and because of substitutability the demand for each crude would be strongly influenced by the whole array of crude prices. Thus relative prices are determined simultaneously by the demand and supply equations of all varieties.

This simple re-statement of basic economic propositions does not throw enough light on methods of price administration appropriate to a system where OPEC and other oil-exporting

countries exercise a significant influence. What method could these countries adopt to fix GSPs for their crudes (other than the marker) and obtain consistent relative prices? Despite costly experiments the technocratic answer, which is to build a model that simulates the market, has failed to provide any useful result.

Much of the literature treats the issue of differentials in terms which seem to imply the following model. Assume that the oil market is a bit slack, which is a way of saying that buyers of crude oil have some freedom at the margin to shop around and make choices. Assume that the buyer of crude oil is a refiner operating a plant with given technical characteristics, and that this buyer is indifferent as to whether he acquires a barrel of crude X or a barrel of crude Y when he derives the same net income from processing either variety. The PRICE DIFFERENTIAL between X and Y should therefore correspond to the difference between per barrel processing revenues adjusted for differences in costs other than the f.o.b. price of crude.

Let P_x and P_y be the prices of crudes X and Y, and $P_x - P_y$ the price differential,

Let P_i be the price of petroleum product i, and w_{ix} and w_{iy} the weights of product i in the refinery yields of X and Y respectively,

Let c_x and c_y be the per barrel refining costs, f_x and f_y the transport costs between the relevant export terminals and the refinery for X and Y respectively.

Clearly we should have

$$P_x - P_y = (\Sigma p_i w_{ix} - c_x - f_x) - (\Sigma p_i w_{iy} - c_y - f_y) \quad (8)$$

The literature on price differentials sometimes tends to complicate the issue unnecessarily by introducing refining and desulphurisation costs to the equation. For a given refinery these differences in costs could be treated more elegantly as differences in yields. Suppose that X is a sweet and Y is a sour crude. In our context the difference between these two varieties is essentially a difference in yields, since Y will give us more high-sulphur fuel oil than X when both are processed in a given refinery. High and low-sulphur fuel oil are two distinct products with prices p_i and p_j determined on product markets by their particular demand and supply functions.

Differences in other costs arising from processing X and Y in a given refinery can be subsumed under yields, since these differences consist in the main of fuel used up and crude losses. Crude losses can be taken as representing a product zero with weight w_o and an output price $p_o=0$; fuel j used up may be deducted from the fuel yield w_j of the refined barrel.

We can therefore simplify the price differential formula set above and put

$$P_x - P_y = (\Sigma p_i w_{ix} - \Sigma p_i w_{iy}) - (f_x - f_y) \quad (9)$$

Σw_{ix} and Σw_{iy} are less than 1, the difference from 1 representing fuel used. Further $[w_i]$ includes a product called crude loss with a positive weight w_o. Note that all qualitative differences between products can be taken into account by specifying as many products i as necessary (with the qualification that appropriate market prices may not be available for all products when the division becomes very fine).

This provides us with a simpler formula for price differentials involving yields, product prices and transport costs but nothing else. Yet this formula, elegant as it may be, still conceals the considerable difficulties which surround the administration of price differentials. One of these difficulties is inherent in price administration as such but tends to be particularly serious in the case of oil price differentials. Administered prices are usually determined on the basis of information generated in a previous period and made to apply (sometimes with adjustments and often without) to a subsequent period. For oil price differentials one takes w_i as given and p_i and f as variables. The trouble is that the spot values of p_i and f tend to vary continually, and in many instances the range of fluctuations is far from insignificant. Thus, any price differential calculated in period D on the basis of information from period D-1 will rarely turn out to be the correct differential for period D + 1.

The second problem is that the approach to price differentials outlined above suffers from all the shortcomings of a micro-economic analysis. It raises, for example, the familiar issue of the representative firm. To seek equilibrium values of relative prices by focussing on the refiner's indifference between this or that type of crude begs the obvious questions: "who is the representative refiner?" and "how representative is the refiner chosen for this exercise?"

There is no typical refiner because technology and markets for oil products differ in their characteristics. The

same type of crude may be processed in a very conventional refinery or in an ultra-modern plant equipped with the latest upgrading facilities. Between these two extremes of the technological spectrum lie a number of refinery types. In other words, it is difficult to accept that particular vectors $[w_{ix}]$ and $[w_{iy}]$ should be considered as representative of yields for crudes x and y in a given market. One is thus driven to calculate averages or to settle for approximation.

Similar problems arise in relation to [f] and $[p_i]$. Crude X may have a privileged market which absorbs the bulk of its exports but it will still be sold elsewhere, albeit in smaller quantities, while crude Y may be imported in three or four major locations. Where should the differential be established? Even if we keep the refinery technology invariant between locations, transport costs will differ. A further trouble is that spot prices for products will also differ from one location to another. These prices tend to move together with time lags in different markets but are never identical. Arbitrage is not instantaneous and is always less than perfect. Mainstream product prices differ much more significantly from country to country, and often from region to region in the same country.

In short, the administration of price differentials following the micro and ex ante approach leaves much to be desired. The more rigid is the method of price administration, the greater are the distortions. In London in March 1983 OPEC fixed a set of GSPs (or if one prefers, price differentials) on the basis of guesses about market parameters. To be sure, some

political bargaining was involved, but the initial set of prices was not thought to differ very much from buyers' perceptions of price relativities prevailing at the time. This set of GSPs, which soon lost their relevance to evolving market conditions, were made to apply for the next nine months of 1983 and were later extended to 1984. To keep a set of relative prices fixed when the marker is in disequilibrium leads to quantity adjustments: export shares change and the pattern of oil trade changes. Rigid administration of price differentials has arbitrary distributional effects which can strain relationships between OPEC members.

The Marker and Price Differentials. To administer the price of the marker crude is one thing, to administer price differentials is another matter. The difference essentially lies in the fact that the marker defines a price level, a reference or a standard which can be taken as an absolute number, fixed during that period of time which separates two (or more) consecutive OPEC Conferences of Oil Ministers. Differentials, on the other hand, are relative prices which must reflect the interaction of changing demand and supply conditions of one crude variety relative to its substitutes.

The administration of the marker price may be construed as a distributional issue (the distribution of the oil rent between exporters and importers) subject to political and allocative constraints. Producers naturally seek to maximise their share of the oil rent by fixing the reference price as high

as they are able to, given the extent of their market power and a number of constraints. The first constraint is political since the full exercise of market power may be inhibited by considerations relating to the security or the wider interests of the state. At times the fear of antagonising a super-power may play a role, and in some instances restraint in the exercise of market power is offered by exporting countries as a quid pro quo in political negotiations on other issues.

But there are constraints of an economic nature:

- the usual "barrier to entry" factor which may set a maximum price for oil in view of possible competition of other fuels;
- the "Hotelling principle" which suggests that the rate of change in the price of a depletable resource should be related in some way to the rate of return on alternative assets.

These two factors refer to important allocative issues, namely substitution (ie shift of resources to other fuels) and depletion (ie the optimum extraction profile of oil). In a sense these are long-term considerations because the technological and investment lags in fuel substitution tend to be measured in years, and because the depletion profile of OPEC oil is in many cases very long.

A third economic constraint arises from the existence of relationships between changes in the price of oil and a number of macro-economic variables such as the balance of payments, the pace of economic growth and the rate of inflation. The full exercise of monopoly power is inhibited by the fear that the short-term monopoly price would be so high as to cause severe economic disruption. The macro-economic impact of an oil price

change may be immediate and this distinguishes this factor from the two mentioned previously.

The macro-economic effects of oil price shocks are sometimes treated as a distributional matter, a case of the familiar income transfer problem. But that is an incomplete approach because economic growth effects and secondary allocation effects (due to the economic policies introduced by oil-importing countries to counteract the impact of oil price changes on their balance of payments) are important.

The administration of price differentials or relative crude oil prices can be construed as an allocative matter (as the concept of relative prices itself suggests) with distributional implications for oil-exporting countries. Short-term market considerations - rather than long-term depletion or substitution factors - would dominate the determination of oil price differentials an ideal system of price administration. The reason, simply, is that the relative attractiveness of this or that type of crude to a buyer and the supply conditions of each variety in a given market tend to change continually. Seasonality, demand patterns for oil products, availability of tankers between two locations, weather conditions in the export terminal areas or in the consuming countries, capacity utilisation in specific refineries and desulphurisation plants, as well as a host of other factors cause changes in the demand and supply schedules of different types of crude oil. The problem, therefore, is to determine prices in ways which remove excess demand (supply) for this or that type of crude as they

arise under the influence of all these variables. We need not say much more to indicate that any attempt at administering price differentials which fails to relate very closely to these changes in market conditions will contribute to the emergence and maintenance of distortions and create disequilibria.

The administration of price differentials has a distributional dimension because of its impact on the market shares of oil-exporting countries. An objective of the system may well be to maintain an agreed distributional pattern of market shares; but this is difficult, if not impossible, to achieve. In practice, the administration of price differentials will continually alter market shares (which at times may cause serious strains in the relationship between OPEC members). The issue is further complicated by other factors which have an uneven impact on export shares, such as exogenous changes in oil supply conditions and in the structure of the demand for OPEC oil.

Another way of looking at the difference between administering the marker and determining price differentials is to say that the former is in the nature of a strategic decision while the latter is tactical in character. In one instance the issues are power, rent, the long-term threat of substitutes, depletion over the lifetime of the resource, and the performance of the world economy. In the other case the game is to respond as best as possible to the day-to-day movements of supply and demand for different varieties of crude in changing market conditions.

Price Differentials Once Again. This analysis suggests the need for flexibility in the administration of oil price differentials. But flexibility is the hallmark of a policy-maker's confidence in his/her ability to achieve the desired result. In the mid-1970s OPEC was fairly relaxed about the conditions prevailing on the world petroleum market (and still sure of itself because of the 1973 successes); it was thus willing to allow member countries the latitude to adjust their price differentials through a process of trial and error in response to changes in relative demand. In 1983 OPEC was worried by the adverse impact of low demand for its oil (and unsure of itself because of the price competition crisis of late 1982/early 1983); thus OPEC resolved to impose a rigidly fixed structure of relative prices and maintained it invariant for a long time. The fear was that flexibility would open the door to new ways of cheating - cheating disguised behind legitimised adjustments of price differentials.

Flexibility does not bother OPEC too much when most member countries happen to be happy with their export volumes, or when they feel that the price differential adjustments made by some members are just restoring a status quo ante for which there is a fair amount of consensus. Historically this seems to have been the case in 1974/5 and in 1977/8; everybody was then producing just below capacity or close to the policy-determined allowable. There was, as it were, a 5-15% tolerance range within which members felt comfortable without having to enter into formal agreements about quotas or shares. A high demand level for OPEC oil was the comforting factor, and there was no need to

raise questions about small changes or try to explain why things were as they were.

Flexibility is perceived as dangerous when most member countries are dissatisfied with their own export volumes, and when there is no consensus about what the appropriate distribution of market shares between members ought to be. This situation naturally arises when demand for OPEC oil is low, that is when production in most member countries falls well below capacity or allowable. In such a situation everybody is tempted to shed prices for extra volume, with the very important proviso that the temptation will be resisted when member countries feel that competitive action leads to an oil price collapse. In these circumstances, discretion in the determination of price differentials invites trouble.

It is thus expedient for OPEC to opt for collective administration of price differentials and to do away with autonomous adjustments. This makes for rigidity because price changes require difficult negotiations between members (the underlying issue always being the troublesome one of export volumes and market shares) which everybody will try to avoid. The temptation, once an initial agreement on prices is reached, is to leave the accord undisturbed for as long as possible.

A rigid price structure will soon involve significant distortions. The irony of it all is that these distortions will bestow on some countries the benefits obtainable from cheating and inflict on others the losses arising from price-undercutting by competitors, since a distorted price structure necessarily

understates the value of some crudes relative to others. What cheating produces voluntarily, the price administration of differentials may cause involuntarily and arbitrarily. Countries which find that the price agreed by OPEC for their crudes understates its value relative to other varieties have a strong vested interest in retaining the price structure unchanged. The corollary is that other countries would be suffering at the same time from the relative over-valuation of their crudes and would therefore want a change. The outcome depends on the bargaining position of these two groups vis-a-vis one another. It should be noted however that the dice tends to be loaded against those who want a change, because when demand is slack and OPEC faces a crisis the motto is "keep things as they stand in case everyhing unravels". Many OPEC countries take the view that the firm maintenance of an agreed price structure, however distorted, is preferable to a discussion which may end up in disagreement on prices.

Prices and the Role of OPEC. The distinction made so far between the marker price and other OPEC GSPs (ie between a reference price and differentials) is useful for the study of methods of price administration. But this distinction should not obscure the fact that the marker crude is only a variety of crude oil which competes with other varieties in international markets. The marker is not an outside reference (like gold for currencies) but one element in a fairly homogeneous set (rather like the dollar for other currencies in the Bretton-Woods system). Thus, the marker price, which we have distinguished from other OPEC GSP's,

may also be seen as one particular GSP among other official prices.

This has some implications. To give one example, the observation that a particular crude is underpriced relative to the marker implies, by the same token, that the marker is overpriced and that it is likely to be losing export volume to other crudes. In that respect the marker does not behave differently from other traded varieties: export volumes tend to be affected by changes in relative prices and this applies to the marker as it does to any crude. The point is simple, but bears on the understanding of Saudi Arabia's role as a swing producer. In a slack market (ie most producers have a fairly significant amount of excess capacity) Saudi Arabia need not absorb a larger than proportional share of a shift in the demand for OPEC oil if the relative price structure is in equilibrium.[8] Disproportionate changes in volume (ie changes in market shares) occur when relative prices are out of equilibrium. Thus the actual role of Saudi Arabia as a swing producer cannot be properly assessed without a close examination of relative crude oil prices. The way in which GSPs stand in relation to each other - either as a result of rigid price administration or of flexible adjustments - determines buyers' responses and the extent of the demand change in favour of (or against) Saudi Arabia. This invites caution in interpreting the role of the swing supplier, as it warns against attempts to explain the behaviour of OPEC without an analysis of relative price movements. The significance of price differentials as a central issue of the economics of OPEC and the oil market cannot be emphasised sufficiently.

NON-OPEC OFFICIAL PRICES

All non-OPEC oil exporters happen to follow pricing systems which involve an official (government) selling price. In that respect and only at first sight, it would seem that there is no difference between those countries and OPEC members. After all, a GSP is the price at which the national oil company or the relevant government agency intends to sell its oil to its customers under the framework of some contractual arrangement.

In some non-OPEC countries (such as Mexico) as in most OPEC countries the official price serves a single purpose, being what we would expect it prima facie to be, a sales or contract price. In the UK however the official price has several functions. It is a sales price for volumes disposed of under contract by the British National Oil Corporation; it is a tax reference price used for the computation of the petroleum revenue tax (PRT); it is also a buy-back price. A similar situation arises in a few OPEC member countries (Abu Dhabi, Libya and Nigeria) where companies have access to "equity crude" and where both fiscal and buy-back arrangements are involved. The official prices are used for tax reference purposes, buyback and also arm's-length sales.

In this context the distinction between producing countries with and producing countries without "equity" or

"participation" oil is more meaningful than the distinction between OPEC/non-OPEC countries.

The real difference between OPEC and non-OPEC producers does not lie in the price concepts used but in the methods of price determination which they follow. OPEC members are bound together by an institutional function - to administer prices collectively. This applies with particular force to the marker crude, but we have seen that in several instances OPEC rigidly fixes the official prices of all member countries' main crudes. Even when OPEC countries take liberties with their individual pricing policies, they seem to feel bound by an obligation to the Organisation's objectives, and all of them eventually return to the conference table, fully aware that they will have to surrender these liberties in some compromise.

Non-OPEC countries are not bound by such an institution. Each determines its official prices on its own; but in doing so they take into account the reference price set by OPEC, the GSPs of the nearest competitors, the market conditions and the possible reactions of major OPEC countries to their "autonomous" pricing policies. The freedom which these countries enjoy through not belonging to OPEC is restricted to some extent by other constraints. Still, the non-OPEC producer has more room for manoeuvre than his OPEC counterpart. He tends to respond more swiftly to changes in market conditions, altering prices as judged appropriate, since he does not need to produce an explanation for other members of the peer group or to find ways in which disorderly pricing behaviour can be made to look well

regulated and nicely ordained. (Paradoxically, some non-OPEC countries have recently found it expedient to explain their price moves to OPEC members, that is outside their own peer group.)

The greater freedom enjoyed by non-OPEC producers on matters of pricing suggests that non-OPEC prices are generally less sticky than OPEC's. Steve Roberts has shown in another paper covering the period 1978 - early 1983 that both OPEC and non-OPEC producers are price makers when markets are in disequilibrium, but that large OPEC producers are slower to react than the smaller ones, and that non-OPEC producers are generally capable of the fastest responses.[9]

In tight markets, non-OPEC countries seem to have no compunction about raising their prices (judging from the evidence of the 1979-80 episode). OPEC countries will respond in a similar but slower way, and Saudi Arabia will tend to display more resistance than any other producer. In some instances the formal behaviour tends to be different: non-OPEC countries would just alter their official prices while OPEC member states would keep them unchanged but add a premium to GSPs or ask for a signature bonus. In such a situation GSPs cannot be taken at face value since the price of official transactions is either

(a) GSP + a per barrel premium

or (b) GSP + a signature bonus/number of barrels actually sold under the contract.

Data on these additional payments are difficult to obtain; even when bonus data are available it is not easy to measure (b) accurately because the volume of oil <u>actually</u> lifted under a given contract cannot always be ascertained.

In slack markets all non-OPEC and some OPEC countries may indulge in price-cutting competition. This clearly happened in late 1982-early 1983. Again the formality will be different - while non-OPEC countries will simply and explicitly lower their GSPs, the OPEC producers will do their utmost to avoid a non-agreed reduction (other than minor changes which can be passed as price differential adjustment). Price competition will thus take different forms, many of which are listed in the RGPEP paper "Oil Prices in 1983: a Critical Year".[10] To recap, these are:

- outright price discounts;
- extended credit terms;
- processing deals under which products are sold at market prices and the producer receives the net-back value of its crude as realized in lieu of the official price;
- barter deals where prices of goods imported in exchange for oil can be artificially inflated;
- package deals under which crude oil is sold at the official price together with refined products or NGLs at discounted prices;
- sales at offical prices but on a c.i.f. basis;
- increased equity margins to compensate operators for off-take booked at official prices.

Finally some OPEC producers sold oil directly on the spot where prices were moving well below official prices. Of course the switch from contract to spot sales at lower than official prices is anathema to OPEC, and usually done very discreetly.

When such competitive episodes occur the GSPs of non-OPEC producers continue to signify what they are supposed to mean, while the GSPs of those OPEC producers who resort to the price-cutting methods outlined above cease to indicate the actual price of official transactions. It then becomes extremely difficult to identify the correct level of these prices.

There are times when oil producers facing a slack market will refrain from severe price competition. Yet non-OPEC producers would still ensure that their oil was priced at a slight advantage vis-a-vis similar OPEC crudes, their twin objectives being the maximization of export sales (which calls for some form of competitive pricing) and the avoidance of a price collapse (which calls for restraint). Non-OPEC countries in which companies have an equity stake (say Britain, Egypt) have an easier task at maximizing output because the oil acquisition costs to the companies tend to be well below official prices. As mentioned earlier a company will always try to lift as much as it can from this advantageous "equity" crude before it starts lifting from OPEC countries where the equity margin may be smaller, and before it begins purchasing oil under contract at official prices. There is no need to undercut the OPEC price structure to ensure maximum production or lifting of equity crude. In slack markets producers who sell either all or part of their crudes (directly) through a national oil company (eg Mexico through Pemex) have to worry about the competitiveness of their official prices when the aim is to maximize output.

We stated however that price competition may not be willingly pursued to the point where a price collapse threatens.

This is a new perception which OPEC and non-OPEC producers alike seem to share. It all started of course after the crisis of March 1983; before that date all non-OPEC and a number of OPEC countries indulged in a bout of price competition which eventually brought the marker crude price down from $34 to $29.

But non-OPEC countries did not respond in the same way as OPEC to the threat of a price collapse. OPEC adopted a production programme and fixed price differentials in a rigid manner, insisting on strict adherence to price discipline. Non-OPEC countries simply decided to keep their GSPs fixed at the levels prevailing in March/April 1983 (the number of non-OPEC countries who have changed their GSPs since then is small and these changes have only occured in isolated instances). None of them, save Mexico, have yet attempted to regulate production. Price is the only policy instrument used.

MARKET PRICES

GSPs are often referred to as administered prices to contrast them with market prices. The former are supposed to be determined by a producers' edict, while the latter are the result of bargains between sellers and buyers, or if one prefers a Marshallian terminology, of an interaction between supply and demand.

Thus GSPs are meant to be sellers' or producers' supply prices. To take the story full circle one could say that GSPs are in fact posted prices. To fix a GSP is simply to state a willingness (subject perhaps to some non-price conditions on the eligibility of this or that buyer) to sell any available quantity of crude oil at this, but at no other, price. A simplified, and slightly rigid characterisation of the GSP system would run as follows. For a period of time -the interval which separates two consecutive fixings of a GSP -the producer would supply any quantity demanded by his customers, given their contracts and overall availabilities, at the price he or OPEC chose to fix. As in all fix-price systems demand shifts are entirely absorbed by producers (up to the capacity constraint) by a quantity adjustment. From time to time, after intervals of varying lengths ranging from a week to months or years, GSPs are altered. These punctual price changes (which may or may not reflect an

adjustment to demand shifts) start a new period during which the fix-price system again operates in the same way.

This characterisation accurately describes the system in those periods (such as 1975-78, or late 1983) when producers were either happy to hold their price line because demand for their oil happened to correspond to ex-ante preferences or were intent on holding the price line for fear of an irretrievable collapse. For other periods the characterization is not accurate and needs to be qualified by referring to the many remarks made in the previous section. The main qualification is that actual prices of official transactions do not always remain rigidly fixed in the interval between two consecutive official revisions of GSPs. At times premia are added; and in rare but extremely interesting instances some countries have changed their GSPs so frequently that the behaviour of official prices began to approximate the continuous variations which obtain in competitive markets.[11] In other words, quantity adjustments to demand shifts (in the range which is unconstrained by capacity) are sometimes accompanied by a price response.

It is worth recalling in this context that producers tend to vary in their behaviour. Non-OPEC producers are likely to adjust prices more frequently (and more openly) than OPEC members as a group; and within OPEC small producers and producers of "speciality crudes" tend to adjust their GSPs more often than the large exporters. Saudi Arabia, often perceived as the guardian of the price, usually stands at the end of this line, a bit aloof and always trying to abstain from price changes that have not

been collectively decided upon.

It is useful to take the hard core of the oil pricing system - the administered GSPs - as the starting point of this attempt to identify the role of market forces and to define oil market prices. The merit of this approach is that it enables us to relate the emergence of markets to structural flaws in the administered price system, to the limitation of its coverage, and to breaches in its defenses. Our purpose is not merely to draw a contrast, in a static comparison, between administered and market prices but to define them both in the context of a dynamic interaction between a "controlling agent" and "free economic forces". The latter continually attempt to erode the power of the former, and try to extend their field of action to areas where institutional control over prices may be receding.

To begin with, assume an initial situation of full control over prices by the producing countries. As Adelman often reminds us it is useful to set up a standard, however absolute (indeed, Adelman's favourite example is the absolute zero in physics), or to take a pole at the extreme end of the spectrum, not to describe reality but to measure divergences and provide a reference. If all producers, without exclusion or exception, fixed their GSPs in harmony with each other (ie relative prices were in equilibrium) and if all of them made these prices apply to all actual transactions with their customers during the period considered, and so long as the producers were collectively able to meet demand at GSPs, there would be no exchange of oil at prices different from official prices other than distress sales (purchases) of a company or refiner who made a planning error

either by lifting in excess of needs or by underestimating an immediate requirement.

We have set up an extreme model of comprehensive producer control over prices; but the interesting point is that this control, though assumed to be absolute over primary transactions, does not prevent the emergence of secondary transactions at prices different from GSPs. A primary buyer who lifted too much oil might make a distress sale at a price lower than GSP (after correction for freight etc) in an attempt to cut his losses. The loss involved in selling at less than the purchase price might be smaller than the cost of carrying an unwanted inventory. Similarly a refiner who finds himself suddenly short of crude might be willing to seek a prompt cargo at a price higher than GSP if the extra cost were smaller than the losses due to insufficiency.

In the 1950s, when the major oil companies controlled prices and supplies of oil in international trade, spot transactions occurred from time to time. They were few and far between, often seen as means of correcting inevitable planning errors. Like moss growing in the cracks of stone pavements, market transactions will be found wherever the planned system is fractured by some flaw. But the prices at which isolated deals are done do not usually indicate broad supply and demand tendencies; they are more likely to reflect the relative bargaining strength and imperfections in the coincidence of wants of two chance partners involved in an odd transaction.

Now relax the assumptions on which our polar case of

complete producer control is based. The facts do not correspond to our assumptions in that:

(a) some producers operate completely or partly outside the administered price system;

(b) other producers from within the system on occasion fail to hold the administered price line;

(c) administered price differentials are hardly ever in equilibrium.

Producers who operate outside the system may normally sell oil on spot markets and through contracts at spot related prices. The existence of such producers enlarges the scope of markets, here defined as places in which transactions involve bids and offers in an interface between buyers and sellers.

Producers from within the administered price system who supply the spot market or consent to the inclusion of spot-related price clauses in contracts when demand for oil is slack, fall in the same category as the producers mentioned in the preceding paragraph.

It is important to note, however, that the influence of market forces is felt within the administered price system even when producers keep away from spot markets and reject the notion of spot-related contracts. It suffices that on occasion they accept to negotiate premia/discounts on their GSPs, because these variations from official prices temporarily introduced in bilateral negotiations can be construed as price elements determined by market forces.

Finally, some arbitrage is bound to take place when administered price differentials are out of line with one

another. Buyers who always have the option of shopping around when demand is slack will try to get out of their contracts with high-price producers and shift their custom to low-price producers. This process tends to correct distortions in the price-differential structure. Further, a disorderly pattern of price differentials encourages secondary trading between those fortunate companies with access to the cheaper source of crude and others in search of a bargain. The general point is that a price distortion often involves an opportunity for someone to make a profit if he can successfully arbitrate. This is how commodity traders do business and manage to prosper. The less perfect the administered price system the greater is the room for market transactions.

The historical development of markets for internationally traded crude can be summarily sketched as follows:

(1) The scope of markets, narrow in the 1950s, was enlarged during the 1960s and the early 1970s when the number of companies operating in the OPEC region increased through the entry of US independents, European publicly-owned oil companies and Japanese firms in Libya, Iran and other parts of the OPEC region. At the same time some OPEC countries established their own national oil companies, the first step on the road leading to direct sales from these NOCs to non-concessionaire companies. An increase in the number of agents with access to crude inevitably led to an increase in secondary trading.

(2) In the mid-1970s the national oil companies of OPEC

member countries (and soon after those of new exporting nations such as the UK, Mexico and Egypt) began on a rapidly increasing scale to sell oil directly to non-concessionaire companies. This development accelerated during the Iranian crisis of 1979 and its aftermath. The demise of the concession system created a market for "official" oil with a direct interface between the growing number of oil-exporting countries and a large number of buyers - majors, independents, European and national companies, Japanese refiners and trading houses, Governments and in some cases oil traders.

In principle, official crude is to be sold by producing countries to their customers at the fixed GSPs prevailing at the time of the transaction. But the notion of a fixed oil price, inherited from a previous era during which it tended to prevail either for fiscal or for oligopolistic reasons, is not always appropriate in a system of direct and free trading relationships. Buyers and sellers, when brought face to face, are always tempted to bargain. When the market tightens up sellers begin to seek a bit more for their oil and try to improve in their favour the terms of the sales contracts; when the market is slack buyers begin to indicate that they have opportunities for shopping around to obtain a price discount or some other advantage. "The need to abide by the official price" will always be used as a convenient argument against change by the side which is being asked to concede a price discount or to pay a premium. Buyers and sellers in turn take behind the sanctity of GSPs, with an apparent lack of concern about the inconsistency of their negotiating postures.

Rather surprisingly GSPs are not always violated. There are times when virtually all producers hold the price line. At other times several exporting countries are found to be selling oil at prices which, in one way or another, are effectively different from the agreed GSPs; yet the behaviour of the few who do persist in holding their prices until they are officially changed through the usual institutional procedures ensures the survival of the GSP system. The situation is one in which the law suffers many a violation but the legal system normally enjoys wide acceptance. The violations, though recurrent, take place in phases and are generally perceived as violations; and it is the behaviour of the offending producing country which is really put in question rather than the pricing system itself.

(3) Room for bargaining is greater with most non-OPEC than with some OPEC countries. The emergence of a new set of oil-exporting countries in the second half of the 1970s opened up new fields for the play of market forces. The British Government explicitly introduced this dimension in contracts with operators on the UK continental shelf by stipulating the tax-reference price as the term price BNOC would fix in accordance with market prices. Ironically this reference to a market, introduced at a time when markets were narrow in size and unimpressive in performance, helped to create and develop them: the very legislation which established BNOC also suggested to North Sea operators a way in which they could optimise their tax liability through a judicious, recourse to the spot market, and influence, if they so wished, the determination of BNOC's official prices

through markets.

(4) Beginning in 1981, the North Sea, or Brent market began to develop. But the development of the spot crude market was also fostered by other factors: the increase in the number of traders willing to take a position on the spot market; the willingness of some exporting countries to move oil on the spot; the emergence of upstream operators with no matching downstream facilities; the forced recourse to the spot by national oil companies such as BNOC or NNPC when receiving particpation crude in excess of the amounts demanded by contract buyers.

(5) Spot cargoes may be sold for prompt delivery - if they happen to be close to the relevant port - or for delivery after the three or four weeks needed for sailing to their destination. As there is no reason why transactions should not be made for cargoes dated two or three months ahead, irrespective of the length of the loading/delivery interval, the spot market began to spread forward.

(6) The development of a spot market in which forward transactions are made invites the establishment of a futures market. This took place in 1982/83 in New York, Chicago and London.

Such an analysis readily introduces a set of different price concepts, each relevant to the particular "market" or "market influenced" situation in which transactions take place. The ACTUAL CONTRACT PRICE, in so far as it differs explicitly or through indirect manipulation from GSPs, is a market influenced price arrived at through negotiation or bargaining between an exporting country (in effect, a national agency) and a company.

It is the price at which the contractual transactions are actually done and may or may not be identical to the CONTRACT PRICE as stipulated in the written contract between buyer and seller. "Market-influenced" does not always and necessarily mean "spot-market related" as the industry would have us believe. Some actual contract prices may indeed be closely related to the spot; more often the relationship is loose. In many instances premia or discounts, changes in credit terms, packaging, payment of signature bonuses etc are introduced in contracts, and their effect is to divorce the actual contract price from both official and spot prices. When indirect methods are used to alter a GSP in a contract the actual contract price is not given and must be estimated as best one can with imperfect data.

SPOT PRICE of a transaction is the price at which a given cargo of crude oil changes hands. A spot transaction, by definition, is a once-for-all deal for a given amount of oil available in one batch at a specified location.[12] At any point in time there may be different spot prices for a given crude variety depending on whether delivery is prompt or forward. To give an example, three spot prices for Brent may be quoted on day D of month X, Brent at X, Brent at X+1 and Brent at X+2. It would be more correct to say that on day D for Brent one spot and two FORWARD PRICES rather than three spot prices were recorded.

Price reporting reviews may or may not distinguish between the spot/forward price of a transaction and prices believed to reflect the current level of offers and bids prior to a transaction. Never use sources which do not state clearly the

meaning of the price data which they provide.

FUTURES PRICES refer to the contract for fixed quantities of a specified variety of crude oil bought on day D of month X which matures on day D of months X+1 ..... X+6. Oil seldom changes hands physically in transactions on the futures market, since speculators buy and sell contracts before they mature in attempts to maximize gains or to minimize losses on margins between prices ruling on the days at which a futures contract is purchased and sold.

THE NETBACK VALUATION

The NETBACK price of crude oil is not a price but an estimate of what a certain crude variety is worth to a refiner given the relevant vector of product prices, the refinery typical yield which is a vector of product shares per unit of refined crude, and some estimate of refining and transport costs. Thus the netback calculation is about product prices and should tell us what is the gross worth of a composite oil product barrel [pw] and the break-even value of the relevant crude for the representative refiner [pw]-c.

A netback is not a measure of profitability, because the calculation is made for the marginal barrel (average or total profits will tend to be different) and because no allowance is made for normal returns on capital. Usually the netback is calculated on the assumption that products are sold on a given spot market. The type of refinery as well as its location should be carefully specified, and the yields and costs determined according to these parameters for each of the crudes selected for consideration.

One can then compare the netback with the spot price, with the GSP or the actual contract price of the relevant crude; this gives netback differentials. And as mentioned in a previous section a possible procedure for determining official price

differentials is to compute the difference between netbacks of pairs of crude varieties.

At first sight a netback differential says whether a refiner will earn something towards his fixed costs or whether he will lose money buying a barrel of crude at the relevant f.o.b. price and selling the manufactured products on the spot market. But the results tend to be sensitive to the assumptions made; they show only an order of magnitude and cannot be generalised.

As netbacks are about the margin they indicate the direction of possible allocational changes. Refiners, if they can, will want to switch to crudes with the higher netback differential (measured algebraically, that is with due allowance to the sign).

There is today a flourishing industry for the computation of netbacks. Companies, refiners and traders examine daily data supplied at a price by several specialist firms, in order to ascertain the tendencies of spot product and crude markets. The netback differential has the convenience of combining parameters from both these markets in a single number. But nobody needs to act as postulated by the netback valuation: "buy crude at p and sell instantaneously the refined products on spot at p_i", since refiners can choose instead to supply their term market, to build up inventories or to sell selectively this or that product. It may be fairer to say that information on netbacks has an influence on the behaviour of economic agents operating on the oil markets, even if the methods of netback valuation rest on assumptions which fail to reflect correctly this behaviour.

THE WORLD PRICE OF CRUDE OIL

We have reviewed a number of oil price concepts and attempted to relate the meaning and significance of each to the particular institutional context in which it applies. The institutions themselves are numerous - different types of markets for "market prices" and different statutes and arrangements for "administered prices".

The survey started with POSTED PRICES, the non-price tax parameters of an era now passed, and it ended with a reference to FUTURES PRICES, the price of non-physical transactions which may play an increasing role in years to come. But the set of oil prices has many other elements. For example, the now largely defunct CONTRACT PRICES for long-term third-party market deals, or contract prices for those official transactions made at prices other than GSPs. There are SPOT PRICES for spot deals, for a cargo exchanged hic et nunc, and SPOT PRICES for FORWARD DEALS, for a cargo to be delivered next month or the month after; and inevitably many spot quotations indicating intentions rather than actual transactions. Companies with a concession in a producing area or with an equity interest would effectively acquire oil at GSPs minus a certain MARGIN, either through a BUY BACK arrangment or through a tax payment or in some other more complex way. In places the same operator may be moving oil from

its own field at two or three different prices.

There are of course OFFICIAL PRICES, for short GSPs. In that set the MARKER PRICE deserves to be singled out. Though in one sense the marker price is just a GSP among others, it plays a role of its own as a reference for the whole oil pricing system and must be construed as a particularly significant parameter. Both OPEC and non-OPEC exporting countries define GSPs, in effect posted prices which express the seller's intentions. As mentioned above a GSP may or may not be the actual price at which transactions are carried out under an official contract. The discrepancy may take one or more forms (premia, discount, new credit terms, packaging, etc) and will arise whenever sellers are willing to respond to a change in their bargaining relationship with buyers and unwilling to formally alter the ruling GSP.

To clear a common misunderstanding that arises from a loose use of imprecise notions, official transactions made at prices different from GSPs are not all SPOT-RELATED. Strictly speaking a spot-related price clause must specify exactly the nature of the spot reference (say a weekly or monthly average, or some other relationship between the contract price and particular spot data). In all other cases where a divergence between GSP and actual contract prices exists, the relationship with the spot price would at best be directional, and contracts which embody such divergences should not be called spot-related. To take one example, when a seller consents to extended credit terms, say to three months in lieu of the conventional 30 days, he is simply

offering a given discount on the official price over a period of time that is totally unrelated to the actual movements of spot prices. (Rather curiously the value of this discount varies with the rate of interest, a totally different parameter from spot prices.)

Different economic agents will tend to be more concerned with one price concept than with the others. A company will look at its AVERAGE ACQUISITION COST per barrel and try to minimize it by switching purchases to the relatively cheaper sources. Differences in average acquisition costs between companies affect, ceteris paribus, their competitive position. A consuming country is naturally concerned with the AVERAGE CIF PRICE of the oil it imports. One can imagine situations in which these various weighted average prices (acquisition cost or cif import prices) would move in a different direction to the conventional oil price indicators, such as the OPEC marker or the spot price of Brent; and it is conceivable that the movements of these various prices, even when they all seemed to change in the same direction, would not always be strongly correlated.

Looking at the world as a whole, it may be useful to estimate an AVERAGE PRICE of INTERNATIONALLY TRADED OIL using export volumes of producing countries as weights and always compare this aggregate with the movements of other prices. They all tell us different things. The spot indicates what happens at the margin; the marker defines the level at which a price peg has been fixed by OPEC, but it is always worth recalling that the fixed level is that of the peg itself and not of the price structure made to hang on it; the average acquisition cost of a

company or a country expresses ex post what the buyer has actually paid for a mixed bag of crudes.

Foreign exchange movements also complicate the story for oil is denominated in US dollars and generally paid for in that currency. Thus a fixed dollar price for North Sea oil maintained when the sterling/dollar rate is falling may mean little change in the dollar value of oil exports for the UK but increased sterling tax revenue for HM Treasury. An importing country in the same situation would pay the same amount in dollar per barrel for its oil imports but more in domestic currency. The balance of payments of an importing country may or may not be affected by changes in exchange rates since much depends on whether the balance is measured in dollars or in the domestic currency and on how exchange rate movements affect imports and exports.

In short the prices of oil may move in different directions depending on the concept used, on the currency in which the price is expressed, on whether an allowance is made for inflation or not, and if so on the particular deflator applied. The simple moral of the story is "BEWARE". Innocent statements such as "the price of oil has gone up" or "the price of oil has gone down" should not be taken at face value when they fail to specify the concept used.

CONCLUSIONS

We have established that at any given point in time crude oil is acquired internationally at different prices by different buyers if not by the same buyer. In some contracts GSPs may apply without adulteration of any sort; in others a large number of "market influenced" price elements may produce actual contract prices that are different from each other and from the well-defined GSPs. The spot price for a particular crude variety will almost certainly be different from both GSPs and actual contract prices, and for some companies in certain places there may be an acquisition price involving an equity margin which bears no relation to the normal return on equity capital, or a service fee per barrel that over-compensates for the services provided. And because price differentials are seldom undistorted crude varieties purchased at GSPs are in fact acquired at different effective prices.

Differences in acquisition costs have obvious distributional effects, and in certain instances these effects may be significant. They also act as a spur inducing agents to seek opportunities for shifting transactions away from high cost (low return) to low cost (high return) sources. In a tight market producing countries will tend to switch to markets where the highest prices obtain and to favour customers prepared to come up

with the best bids. In a slack market buyers will try to shop around for the best bargains.

In such situations the economic theorist always expects prices to equalise. But oil prices seem to remain stubbornly unequalised. To express surprise at this lack of homogeneity does not necessarily reflect a naive belief in theoretical truths, but rather a desire to seek an explanation. Theory helps us formulate questions which may enhance our understanding of the real world, but the theory must be both good and relevant however abstract its relationship with actual phenomena.[13]

Prices ought to equalise because it always pays the economic agents involved to move out from some places and to move in elsewhere. The very existence of distortions sets powerful forces into motion which tend to equalise prices. But strange as this may seem, the tendency never attains its target. Equalisation is the end of a process which never ends; and perhaps what matters most is the very existence and operation of that equalisation process which challenges entrenched vested interests, loosens constraints, tests obstacles, invents round-about schemes to by-pass certain difficulties but fails to remove them all.

Why do not all buyers move to the spot market when spot prices are below official prices? Why do not all sellers set their premia to the level of the highest spot price when the market is tight, or their discounts to the level of the lowest spot price when the market is slack? Why does the equity margin tend to be widened when the economic return on capital at the

margin is brought down to zero by the emergence of excess capacity? Why...? The list of relevant questions can be lengthened almost indefinitely.

One can also list some items where the answers probably lie. The headings are imperfect knowledge and information, uncertainty, institutional constraints (including contracts), time lags and restrictions on the mobility of agents and on their free access to all possible sources of supply.

In a slack market buyers will want to walk out on high price contracts and seek cheaper supplies on the spot, but all of them may not entirely sever their contract links due to uncertainty. They may be uncertain about future changes in market conditions, and fear the loss of goodwill of a producing country that they may need during the next supply crisis. They may also be uncertain about the regularity of spot supplies and prepared to pay more for contract oil that can be obtained with good time scheduling in a smooth flow. And do not forget that breaking and re-negotiating the contract later involve costs.

Buyers are also uncertain about producing-country responses to a walk out. If the countries do not immediately supply the spot market with the quantities made available by the phasing out of contracts (assuming that total demand has not changed) then the spot price will rise, perhaps above official, and buyers who switched too quickly to an apparently cheaper source might find themselves incurring losses. Thus the inertia of producing countries, or more precisely their delayed response to the actions of quick-footed buyers, induces some inertia among some of their customers. Equalisation is not easily achieved

when some prices are sticky and when the agents' responses involve significant time lags.

Information is far from perfect on the oil market. There is a lack of price transparency, a more significant weakness in the reporting of production and export volumes. Demand forecasting is generally bad, and basic facts about inventories are shrouded by dusty clouds of disinformation, speculative guesses and arcane mysteries. There is also some lack of understanding of the behaviour of some agents, particularly oil-exporting countries, on the part of the many newcomers who now crowd the oil scene.

All these factors affect the action and re-action of agents. They may be induced to move in the wrong direction, or to pause and wait until they obtain clearer signals for a particular move they may be contemplating.

Because of these and many other imperfections price equalisation is never really achieved. Looking at the issue from a slightly different angle one could say that oil is traded in different markets that are closely but incompletely related to each other. There is some segmentation introduced by differences in the form and content of contracts. If agents were able to move with absolute freedom, instantaneously and at no cost from market to market, prices would tend to converge much more closely. But they are not, and segmentation is a convenient way of summarizing the many slight impediments to perfect mobility across markets and over time.

To identify the price equalisation issue in these terms

can lead to the formulation of testable hypotheses on the structure of the oil market, the nature of its imperfection and the behaviour of agents. The investigation of these matters is what our continuing research in this field is about.

Finally, and this is perhaps the most substantial conclusion, we argued that the existence of an administered price system does not abolish the play of market forces. But this does not mean, as so many are now fond of arguing, that these market forces will necessarily abolish the institutional pricing system. Such an outcome is not pre-determined a priori but depends on the relative strength of the factors at work and the mode of their interaction.

The world oil market emerged in the mid-1970s in the form of an inter-linked set of markets as the demise of the concession system operated by a small number of vertically integrated multinational oil companies was taking place. Disintegration externalised transactions which used to be conducted within company channels. It also brought producing countries and companies to a trading interface, opening up opportunities for bargaining, that is for the emergence of market-influenced, non purely administered prices. The sheer increase in the number of primary lifters further increased the scope for secondary trading.

Paradoxically it is OPEC which contributed to the growth of oil markets, through the little publicised revolution which gradually abolished the concession system. The rise of significant non-OPEC exporters towards the end of the 1970s hastened and completed this development. As it happened non-OPEC

exporters, particularly Britain, Norway, Egypt and Oman, contributed to changes in the structure of the oil industry which were initiated by their OPEC rivals just before they themselves emerged as a significant force.

Why should agents with a clear vested interest in maintaining their administrative control over prices open up an arena for market forces that may challenge their control is an intriguing question. Economists may be inclined to attribute it all to the competitive instinct; yet in this instance the initial drive was political, because exporting countries in the 1960s simply wanted to exercise full sovereignty over their natural resource, from production to marketing, from investment to prices. They succeeded over the broad front and markets emerged partly as a by-product of these endeavours.

But now that the markets are there and expanding, the temptation for oil-exporting countries to use them to obtain higher prices or to move higher volumes may be strong. (To say that the competitive instinct was not initially the prime-mover does not mean at all that this instinct is blunted and incapable of manifesting itself subsequently). In fact the experience of direct marketing acquired in past years by OPEC National Oil Companies and similar agencies has enhanced competitive skills and encouraged their application.

Hence the dynamic and perhaps unstable state of affairs which characterises the world of oil today. Two pricing systems obeying two different laws co-exist, not in isolation from one another, but within a web of complex interactions. The vested

interests which maintain one of these systems in existence are extremely powerful and extend well beyond OPEC, and well outside the group of oil-producing countries. The powerful market forces associated with the second pricing system tend to batter, like strong and high waves, the institutional dyke which price administrators have erected against them. Though defaced, the dyke is still holding against the pressure.

Whether this state of affairs, however uneasy and precarious, will maintain itself for years to come or whether the market will soon prevail over the administered price system, is a question of considerable interest to all actors on the energy scene. Our purpose here, and one of the objectives of our future work, is to prepare the ground for a clarification of this issue.

FOOTNOTES

1. Kuwait and Libya are notable exceptions. Towards the end of the 1960's these two countries began to worry about the depletion of their resources and talk about or apply conservation measures.

2. Whenever the prices at which actual transactions are done turn out to be different from the posted numbers, because the seller (or the buyer) accepts "posting plus a premium" or "posting minus a discount", one should start to question the economic meaning of the concept. In such instances posted prices are no longer quotations but the starting point of a bidding process. They may tell us something about the initial perceptions of agents or about some institutional coventions; but they tell us precious little about movements in actual prices. Continual variations in premia and discounts dissociate the posted price from the actual price series; and in such cases it would be totally misleading to draw any inference from the behaviour of posted prices. The meaningful data are changes in premia and discounts from a given base.

3. Many observers believe that OPEC members fall neatly into two categories: moderate/conservative and militant/radical, as if these characteristics were indelible birthmarks. In fact behaviour varies continually. "Moderate" countries have often taken hard stances and "radical" members have sometimes shown moderation. Behaviour depends on a host of factors other than the political colour of the regime, and tends to vary according to the issues involved, the political, economic and financial circumstances of the country at the time, and more often than not, according to international relations.

4. Ian Seymour, OPEC, Instrument of Change, Macmillan, 1980.

5. Strictly speaking, those who insist on using the term "OPEC price" as a short-hand notation ought to reserve it to the marker crude. This is the only price which OPEC consistently attempts to administer. To be sure, other GSPs are sometimes determined by a collective OPEC decision, but on many occasions OPEC has allowed its members to adjust their GSPs in the light of market developments. And in some instances OPEC has gone as far as to leave its members

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