the sheer industrial scale of solutions inhibits real action. What then can be done to start a serious programme of reduction in global atmospheric carbon quickly? The international oil industry has the necessary skills and requirements:

- Financial strength,
- International presence,
- Major projects are the norm,
- Geological expertise,
- Spare oil and gas infrastructure as fields deplete
- Trading expertise,
- Dealing with political risk.

The low value of carbon and the political uncertainty has quite understandably resulted in the international oil and gas industry having no interest in using its strengths to reduce atmospheric carbon. However, if the industry was obliged to purchase carbon permits for a proportion of the hydrocarbons it produced, this most important business sector would be brought into the carbon reduction market. It would be neither reasonable nor practical to make such a radical change to the industry in one step. The proportion of their production for which oil and gas producers would be required to have carbon permits would start at a low level, say five years notice of 5 percent, then be increased on an annual basis. The attraction of this model is that it allows the political expediency of sheltering some sectors to continue, but brings to the problem of atmospheric carbon the only major industry with the necessary technical, financial, operational and organisational wherewithal to implement a solution.

Without doubt such a change requires international agreements and controls. In realising this, it is essential that politicians develop a shared business model that will work within acceptable time limits and on the industrial scale required. It is certain that in developing and applying this model, the UK can through its international political influence have a far greater impact on this global problem than it can from the effects of eye-catching local measures. Involving the oil and gas industry in this solution should be politically very attractive. It will start a solution but the path forward must be clear and free from political horse-trading for confidence to help sustain long-term investment. The development should be attractive to the oil industry, for it gives it a future beyond petroleum.

The Oil Price Regime

Bassam Fattouh shows its challenges to OPEC

Many observers interpreted OPEC's decision in October 2006 to cut production by 1.2 million barrels per day (b/d) and the Organization's latest announcement of a production cut of 500,000 b/d to be implemented in February 2007 as signals that there is a new oil price floor that it would like to defend. The *Financial Times* interpreted OPEC cuts as a clear indication of a 'determination to defend $60 as its new minimum international price'.

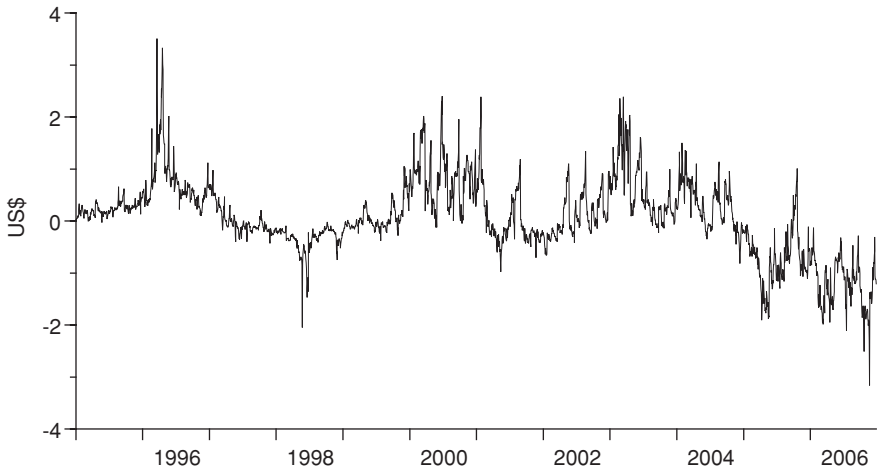
Although OPEC's president has announced that a price below $60 'is very low and it is not good for investors' and that 'something needs to be done to steady the price' and although price hawks Iran and Venezuela indicated more than once that OPEC would no longer tolerate prices below $60 a barrel, it is premature to jump to the conclusion that the Organization has adopted a new oil price floor as a matter of policy or any other price floor for that matter. It is also premature to assume that OPEC's latest decision in December is about protecting this price floor. The Saudi Oil Minister Ali Naimi declared during the OPEC conference in December 2006 that the price, whether above or below $60, did not figure in their latest decision. He argued that what the Organization is looking for is to re-balance the market claiming that 'there is a disequilibrium between supply and demand' and that OPEC is 'trying to get the market to the normal equilibrium and the price will take care of itself'. Many newspapers quoted Ali Naimi as saying that 100 million barrels of crude oil had to be trimmed from world stocks to balance supply and demand.

OPEC officials have been conveying recently their strong concerns about the high build-up of inventories in the USA and other OECD countries. By end of 2006, crude oil inventories in the USA stood at 321 million barrels which is 25 million barrels over the five-year average. OPEC is concerned that the release of large stocks of crude oil can flood the market with the effect of driving oil prices downwards to unacceptable levels. Furthermore, high levels of inventories are usually interpreted by oil analysts and traders as a sign of oversupply in the crude oil market.

OPEC's views about rising commercial inventories were made explicit in 2004 when Ali Naimi argued that 'a stock build always concerns us' and that 'whenever the stock level is high the price is low and vice versa'. He then raised the difficult question: 'do you wait until the build-up in inventory [occurs] and have a precipitous price fall or do you take a pre-emptive, proactive course of action?' The latest OPEC decision can be best understood within this complex dilemma.

The above raises the following questions: why have total commercial inventories risen so fast in recent years? Is there anything that OPEC can do to slow the process of

Figure 1: First Month Futures Contract minus Second Month Futures Contract for WTI



inventory accumulation? And if the answer to the latter question is yes, what are the costs associated with a policy that targets inventories?

Some have argued that the current build-up of inventories is the result of oversupply in the crude oil market. When supply exceeds (effective) demand at any point in time, the difference would be added to stock levels. This explanation however suffers from a major drawback: why would customers want to lift more crude oil than what they would effectively demand? Unless there is an incentive for them to hold inventories, customers are under no obligation to absorb the oversupply from the oil producers. Supply does not create its own demand!

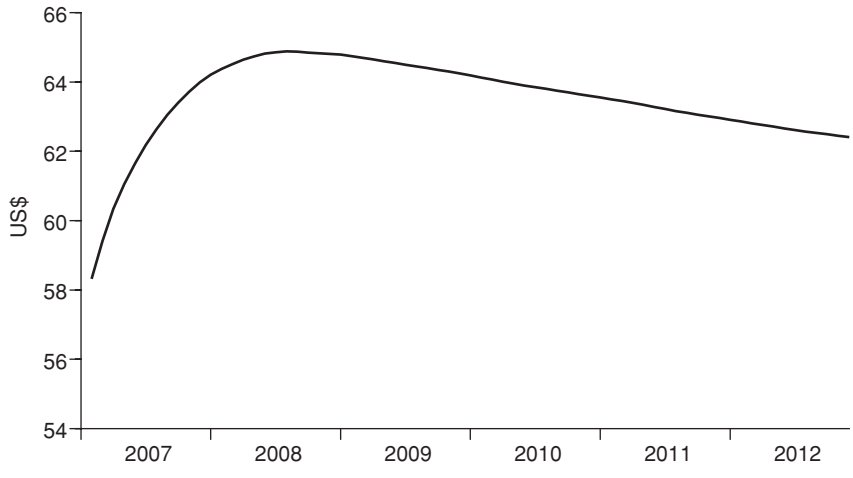
Others have suggested that the current build-up is driven by the demand for precautionary inventories in the face of tightness throughout the oil supply chain. For instance, *Petroleum Argus* (19 June 2006) argues that the market is signalling that 'just-in-time inventories are no longer appropriate as OPEC has lost the spare capacity that enabled it to act as a buffer, shifting stock risk management down the crude supply chain to refiners'. This explanation implies that private oil companies would build up their inventories even when it is costly for them to do so. It also implies a fundamental shift in the behaviour of oil companies and refineries towards a new inventory policy.

Since the mid-1980s and under pressure to maximise shareholder value, international oil companies have undergone major cost-cutting exercises including cutting inventories to their lowest possible level and shifting to a 'just in time' policy. In this new era, oil companies have relied on OPEC's large holdings and consuming countries' strategic petroleum reserves (SPR) and on a developed spot market for immediate deliveries. Thus, the shift back towards a new policy of holding precautionary inventories would imply a break in a strong behavioural trend. There is nothing to suggest that this has happened. Given that international oil companies are under pressure to maximise shareholder value, the proponents of structural shift in inventory policy must show how holding precautionary inventories would maximise shareholder value even when it is not commercially profitable to add to inventories.

A more plausible explanation is that the recent build-up of inventories is due to the price term structure of WTI or Brent. In an influential article, Litzenberger and Rabinowitz (*Journal of Finance*, 1995, no. 50) noted that 80–90 percent of the time the oil forward curve is in backwardation, i.e. futures prices are often observed to be below spot prices. One striking feature of the current market however has been the prolonged contango in the WTI/Brent forward curve. Figure 1 shows that during the last 20 months or so, the nearby (delivery) futures contracts have been trading at a discount to the second month futures contract. Figure 2 which plots the WTI forward price curve at the beginning of 2007 shows a very steep slope with the nearby contract trading at a discount of $6.5 to the August 2008 contract.

Given this oil price term structure, it is no surprise that commercial inventories have been rising fast. If the price of oil for future delivery is trading at a large premium over the price of oil for immediate delivery, this would cover the costs of carrying inventories prompting market

Figure 2: WTI Forward Price Curve (as of January 3, 2007)



participants with storage facilities to accumulate inventories, stock up their tanks, and lock a profit by selling contracts in the futures market. Finding a buyer to take the other side of the bet is not a problem in the current environment where many investors expect tighter crude oil market conditions in the future and where geopolitical uncertainties and a thin spare capacity cushion have made financial bets on potential supply shocks extremely attractive.

According to this explanation, a slowdown in the process of inventory accumulation requires either a change in the oil price term structure from contango to backwardation or for the scale of the contango to narrow to such levels that would make it unprofitable for investors to accumulate crude oil inventories. In effect, both of these cases require a sharp rise at the front side of the oil price curve. Thus, if OPEC wishes to trim the current level of inventories, it can achieve this by tightening crude oil supplies for immediate delivery pushing upwards the front side of the forward price curve.

"under pressure to maximise shareholder value, international oil companies have undergone major cost-cutting exercises including cutting inventories to their lowest possible level"

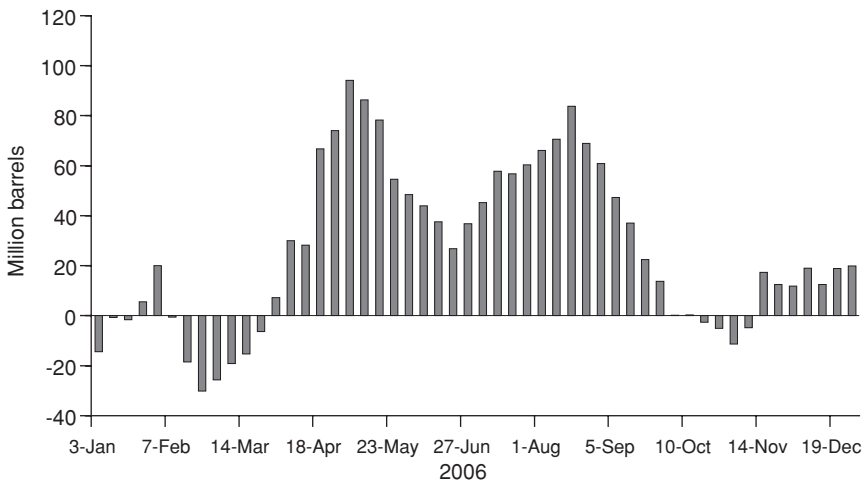
In the last two months or so, commercial inventories including crude oil have been declining in the OECD and the USA. Other things being equal, if this decline continues, then OPEC is unlikely to go ahead with the agreed production cut. If on the other hand, the current decline in commercial inventories is reversed and if commercial inventories begin to rise, then OPEC may be under pressure to take pre-emptive action to bring them to lower levels. Either way, OPEC is faced with very difficult options. The reduction in the scale of the contango would require large output cuts. If these are implemented, the Organization will be criticised on the ground that it has overreacted to current market trends and engaged in unnecessary excessive tightening. It will also be accused of stifling global demand and world growth by causing oil prices to rise. In addition, it may be accused that, by its deliberate policy to keep inventories at very low levels, OPEC is contributing to higher oil price volatility. On the other hand, if OPEC does nothing, then the build-up of inventories can continue, increasing the probability of a sharp downturn in oil prices in the next few months.

Although in the past few months rising inventories represented and still represent a major concern for OPEC, the strong bearish sentiment that has engulfed the oil market at the beginning of 2007 will certainly gain top priority in the Organization's agenda. At the time of writing (5/1/07), the price of an OPEC basket of eleven crudes stood at $51.25 a barrel, a decline from $59.06 over a month ago (8/12/06). The bearish sentiment also resulted in the shift of speculative funds from the long side to the short side of traders' positions which in turn contributed to the fall in oil prices. Although the futures net long positions of non-commercial traders have been slightly rising in the last months of 2006, the current crude oil futures net long position of 19.8 million barrels is only a fraction of the net long position witnessed in August 2006 when they reached close to 84 million barrels (see Figure 3). The sharp fall in oil prices at the beginning of 2007 and the downward swing in commercial traders' net long positions have occurred despite the fact that the fundamentals that have driven the oil market in the last year did not change so much as to explain such falls in oil prices.

"the recent build-up of inventories is due to the price term structure of WTI or Brent"

The main question is: can OPEC influence the bearish sentiment? In principle, they can send signals to the oil market through their quota decisions indicating that they are not happy with current prices or with the way prices are moving. However, this mechanism may or may not succeed, depending on how the market interprets the signals. Specifically, the effectiveness of the signal will depend on whether the market believes that OPEC is able to undertake the necessary output adjustment. If the

Figure 3: Crude Oil Futures Net Long Position of Non-Commercial Traders (million barrels)



market responds to OPEC's signals, then the Organization may not engage in excessive tightening. In the current market conditions, however, many traders are attaching little credibility to the Organization's announcements of production cuts. The bearish market is asking to see the cut before believing the announcement. If this view continues to dominate the market, then OPEC may resort to large production cuts to break the negative sentiment.

"An important consequence of the current price regime … is the wide range of factors that OPEC needs to consider in making its output decisions"

Alan Greenspan noted in 2004 that 'when in the last couple of years it became apparent that the world's industry was not investing enough to expand crude oil production capacity quickly enough to meet rising demand, increasing numbers of hedge funds and other institutional investors began bidding for oil'. Some argue that the current sharp fall in oil prices is caused by the reversal of these flows away from the oil market as other financial markets have become more attractive. If this hypothesis is correct and the oil market is indeed witnessing a large migration of funds which are driving prices downward, then there is little that OPEC can do to counter the effects of such outflow.

An important consequence of the current price regime which takes reference prices from the futures market is the wide range of factors that OPEC needs to consider in making its output decisions – including the level of inventories, the forward curve's shape, the size of speculative positions in the futures market, the traders' bearish or bullish sentiments, and funds flowing in and out of the paper market. This greatly complicates the decision-making process for the simple reason that OPEC has only one policy tool at its disposal (implementing production cuts) with which it would like to achieve a wide range of objectives. This may have undesired consequences on oil price fluctuations inducing volatility and causing sharp rises or falls in oil prices in some instances. But it seems that in the absence of any alternative, this is a cost or a risk that all market participants, including OPEC, are willing to bear and live with.

Robert Mabro questions the suitability of the current oil price regime

Bassam Fattouh's article focuses on two features of the oil futures markets that influence price movements in ways sometimes unrelated to changes in the supply/demand fundamentals. These are, first, the contango that characterises the term price structure at certain times and, secondly, the flow of monies from financial institutions, such as banks and hedge funds, in and out of a commodity market.

The contango has a perverse impact when the price differentials between successive contract months are sufficiently large to involve profits from buying physical oil up front and selling a futures contract. The additional oil so bought finds its way in commercial inventories. Other things being equal, the rise in inventories causes prices to fall.

The flow of funds in or out of a market need not be very significant on average (all that matters is what happens at the margin). The impact on prices can be considerable in response to what may seem to be a small change in the demand for futures contracts. Expectations about the *relative* profitability of investments in different financial markets (commodities, foreign exchange, equities, bonds and so on) is a determinant of the allocation of funds between them and therefore of their movements from this to that market.

In the past three years, commodities were considered to be more attractive than other financial markets. Money moved at the margin between these markets, adding to the fundamental forces that were pushing prices up. In the first days of 2007 the exit from commodity markets which had begun three or four months earlier on gained momentum. Oil prices went down in a way that some described as a free fall. Expectations about the future behaviour of economic fundamentals – mainly oil demand pessimism and over-optimism about increases in non-OPEC production – definitely played a role. So did expectations about the relative performance of other financial markets (for example equities) which did well in 2006.

All that raises a very crucial question: is the current regime for oil in international trade the best possible one for determining prices in response to changes in economic fundamentals without exaggerated volatility?

The current oil price regime, which came into existence after the 1986 counter-shock, involves price formulae including a reference or marker price and an adjustment factor that takes into account differences in quality and other properties between the marker and the traded crude.

For sales West of Suez most exporting countries now take marker prices from the futures exchanges for WTI (NYMEX) and Brent (ICE Futures). This was not always the case. Initially, reference prices were taken from spot markets (some exporting countries still do). Gradually, the realisation that these markets are beset with serious

problems grew and induced a preference for markers taken from futures exchanges. Alaska North Slope (ANS) was abandoned as a reference spot crude because of very limited physical liquidity. Manipulation, partly for tax optimisation reasons and partly for trading strategies, of Brent spot and forward physical (the famous 15-day Brent of yesteryears) gave rise to misgivings about the use of dated Brent prices as a reference. The fact that WTI is a pipeline, not a seaborne, crude also posed a problem because of vulnerability to squeezes.

In theory, a spot deal is a transaction at the margin of the market. It reveals the marginal price of the oil barrel, that is its 'economic' price. This is only true however if the transactions are not few and far between and the market is reasonably free from distortions and manipulations.

"True, futures oil markets cannot be easily squeezed but there is strong evidence of leadership by a small number of players"

At first sight, the futures markets seemed to offer a better alternative. First, liquidity, that is the volume of daily trades, is huge compared with the production of the chosen marker crude. Hence, the view that a futures oil market cannot be squeezed. Secondly, prices are published instantaneously for everyone to see. They are the actual prices of futures contracts. Hence the view that futures markets are transparent. True, futures oil markets cannot be easily squeezed but there is strong evidence of leadership by a small number of players – mainly but not exclusively financial institutions – who are considered by other traders as having superior knowledge, sophisticated strategies or significant weight at the margin.

True, futures markets are transparent insofar as prices are concerned but no data are provided on the volume traded by participants. This affects the ability to interpret price movements in a correct way and opens the door to rumours and pseudo-explanations which in turn may affect behaviour.

The most important qualification, however, is that the futures price that arises on the NYMEX or ICE Futures is that of a *financial instrument* which in the NYMEX involves a claim on oil by the buyer who still holds a contract on its expiry date and an obligation to supply by the counterpart. In ICE Futures, contracts held on the expiry day are settled in cash on the basis of a price index.

NYMEX traders who buy or sell futures contracts rarely intend at the outset to obtain or supply physical oil. Their objective is to make a profit from price movements. Many positions are closed on the same day as they are opened. Some are carried over a number of days (the open interest) but very few are held over a long period. And this is probably true of long-dated futures contracts.

All the talk about risk management, hedging and speculation, although not without some analytical usefulness and elements of truth, also serves to obscure an important reality. Essentially, all participants are taking bets on oil price movements in the futures and other derivative markets, often covering the position by another related trade. The objective is to make, if lucky, competent or powerful, trading profits.

The hedger transfers risks onto the speculator but inevitably bets on a hedging price that will hopefully minimise her risks. The speculator takes the other side of the transaction, betting in turn on the price involved, hoping that the actual outcome will involve profits. She will probably hedge the deal entering with another party in another transaction.

People making different bets have different perceptions of the likely evolution of the market over the relevant time horizon of the contract. If everybody had the same opinion there would be no transaction. The relative weight of different views moves prices in one, or the opposite, direction. And in this sense we say that the betting leads to 'price discovery' which in reality means the discovery of the *ex ante* majority view of the market.

The discovery, however, is that of the price of a financial instrument with an oil label; still a financial instrument traded in a financial market.

"the futures price that arises on the NYMEX or ICE Futures is that of a *financial instrument*"

As a financial instrument of interest to investors, the futures oil contract belongs to a wide set of such tools. This explains the predominance of financial institutions among participants in the oil futures markets and the leading role they play in influencing the direction of price movements. Econometric models show that the net position of the so-called 'non-commercial' traders is correlated with the subsequent direction of price changes. In other words, when the non-commercial entities hold net long positions (they are betting on a price rise) prices often do rise. And the opposite impact occurs when these entities hold net short positions. Is it not odd that the non-commercial players (meaning very broadly the non-oil companies) should lead and the commercial entities (broadly speaking oil or energy companies, oil users and oil-related agents) should follow in what is supposed to be an oil market?

One could infer that the financial institutions lead because the futures oil contracts are traded in a financial market, that is on familiar territory.

Because the futures oil contract belongs to a set of similar instruments of interest to investors, the influence of expected relative profitability of different markets in the set is bound to be significant as mentioned at the beginning of this article. The investor seeks to optimise the portfolio of instruments she may be holding. Available funds to an investor are not unlimited so shifts at the margin are bound to occur to achieve the

optimisation. This implies a non-oil influence, at times strong, at times weak, on oil price movements.

This does not mean that the price of a futures oil contract is not influenced by oil news – data about current developments and events and, more importantly, traders' views about the future impact of possible geo-political, climatic or economic events on tomorrow's supply and demand conditions. After all, the futures market, by definition, is about the future.

The inference is that the futures oil contract is about oil and other things, not one hundred per cent about oil. This would have been of little significance if the price movements caused by the non-oil factors (more precisely the shift of funds in and out of the oil market) were always small. We have recently witnessed very significant rises in oil prices from 2002 to 2006 and a precipitous fall towards the end of 2006 and, more dramatically, at the beginning of 2007. The oil fundamentals – a huge increase in oil demand in both China and the USA and tight supplies – explain the 2004 price rises. The US Gulf hurricanes were partly responsible for price rises in 2005. By then, however, both the demand and supply situation had eased. The first question is why did oil prices continue to rise so much, and the second is why did they then fall as they did in late 2006 and early 2007? It is difficult to believe that the fundamentals of supply and demand cause on their own an increase from say $30 per barrel to a peak (albeit short-lived) of $78 per barrel, and then a fall from this peak to some $50 per barrel (and perhaps less by the time the ink dries up on this paper).

To apportion price changes between different factors is an impossible exercise that should not be attempted. The fact remains that there are non-oil determinants to the price which oil producers cannot control and which sometimes cause de-stabilising and economically disturbing fluctuations. These determinants are inherent to the nature of the current price regime, embedded, as it is, in the futures market.

All that suggests that we should not consider the current oil price regime as appropriate to the purposes it is intended to serve; these being to provide signals that reflect the true supply/demand situation, to allocate resources efficiently, particularly for investment in capacity, and to avoid disruptive volatility due to factors other than economic fundamentals.

"The inference is that the futures oil contract is about oil and other things, not one hundred per cent about oil"

There are problems other than those arising from the characteristics of futures markets that have an impact on price movements. To mention but a few, there is the poor quality of oil information; the prejudices, self pleading, attempts at manipulations that disturb the interpretation signals by OPEC and other relevant players. The fact that a large proportion of trades in the futures (and other derivatives) oil markets are about spreads etc., not the flat price, suggests that price formation does not result from the apparent huge liquidity that characterises the markets. The liquidity that has a bearing on prices seems to be small.

The main problem, however, is that oil prices can move over a fairly long period over a wide range between a low cost floor and a high economic ceiling. Low oil prices do not immediately impact on supplies. Producers do not shut in fields when oil prices fall toward operational costs, or even lower. Before shutting in a well or a field a producer will wait for as long as possible for a reversal in the price trend. Shutting down a producer's asset is often expensive and in the case of small stripper wells irreversible. The impact of low oil prices on supplies is thus delayed. A low price may stick close to the cost floor for a year or even longer.

My guess-estimate is that the world petroleum system can deliver for a while the current demand requirements (say 85 million barrels per day) at a price of $15/barrel because of this delay. When supplies begin to decline some idle capacity in the Gulf will be brought back into production thus compensating for the lost supplies. Low prices have a negative impact on investments needed to meet future growth in demand, not on current supplies, as is evidenced by events in 1986 and 1998.

Do high oil prices affect demand? They do, of course, but the negative impact seems to be initially small. Here again there are mitigating factors and delays. The price effect of demand is mitigated by the excise tax cushion on petroleum products imposed by many countries (except the USA), the very low elasticity of demand for automotive fuels and other factors. Surprisingly, the rate of growth of the world economy was not apparently affected by the oil price rises of 2004–6. Prices could therefore rise to $60 or $70 without causing a reduction in demand.

The $15–70 price range is thus wide open for the market to roam up and down before hard economic factors provide anchors to the fluctuations. There is a clear need for a stabilising influence.

Today nobody is seriously questioning the merits of the current price regime. All the relevant parties have an interest, albeit different in each case, in maintaining it. The OECD countries, having always argued that oil prices must be determined by a market, are not now going to reject a system of 'market-related' prices. One is tempted to say 'by a market, yes, but which market?' OPEC does not want to carry the burden of administering prices, so why question the current system? And the big international banks, and many big oil companies, make huge profits from their trading activities. Their powerful lobbies support the current system.

We shall never know if there is a workable alternative, unless serious research is undertaken. The answer may or may not be that all other conceivable systems have worse characteristics. To refuse to investigate the issue is a sin of omission.