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FORECASTING OIL TRENDS: MIRRORS OR TELESCOPES?

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Forecasting is an essential planning tool for any industry. It is particularly so for the oil industry where investments, especially in the upstream sector, often do not begin to yield an income stream until 6-8 years after the investment decision has been made. Thus, medium and long-term price forecasts are a required part of the information package on which investment decisions are based.

The inherently speculative nature of these forecasts and the knowledge that their accuracy very rarely approaches 100 but sometimes is rated zero is of course taken into account when acting on these forecasts. But it has not diminished the need for them. On the contrary, one approach to reduce the built-in uncertainties is to make forecasts more frequently, taking new factors into account on an ongoing basis.

Medium to long-term forecasts (5 to 15 years) usually look at the reality of current and recent price and market factors as a base from which to peer into the future. In other words, we start by looking into the mirror and then peer into our telescope, which is not a crystal ball but a rational instrument for calculating projections, to best-guess the future. Not surprisingly, the mirror often looms larger than the telescope in these exercises since it represents the non-speculative factual base of the forecast. In the 1950s and 1960s this emphasis on the mirror image usually turned out to be correct; in the 1970s and 1980s, it led to forecasts that bore very little relation to reality.

To 1972, the mirror was almost the same as the telescope

Throughout the post-war period until 1972 the future did more or less reflect the past as far as oil prices were concerned. Prices were remarkably steady throughout the period, with brief exceptions caused by extraneous events. Take the period 1960-70. While world oil demand was rising at an average annual rate of 8%, reaching new historic highs each year, oil prices actually declined slightly in *nominal* dollars (Arabian Light dropped from $1.86 to $1.35/Bbl). The reason was that the long-term strategy of the international oil industry -- principally the Seven Sisters -- was to gain *market share*, both in its intra-industry and its inter-fuels (mainly with coal) competition. The growth in volume provided these companies with rising revenue as well as rising earnings and so enabled them to carry out this strategy. Another stabilizing factor during this period was the Texas Railroad Commission and other State production agencies in the U.S. whose function was to protect the value of the resource by assigning maximum production allowables. In 1970 when allowable production equalled capacity, this function ceased.

Thus, during this extended period the mirror was almost the same as the telescope. Furthermore, the price trend in the 1960s reflected the industry's own policy. An industry forecast in those days was largely an exercise in introspection. Hence, the uncertainty element inherent in forecasting was relatively small.

In 1973, all this changed...

In 1973, all this changed of course and forecasts now had to be based largely on perceived developments outside the industry's control. What is the forecasting record of the industry and other institutions under these changed conditions? One answer can be derived by examining post-1973 forecasts and comparing them to actual market performance in the forecast period. Let us select 1983 as a base period for this purpose and compare the 10-year forecasts made then with the market reality of 1993. The observations from this exercise may have applicability to current forecasts made for the first decade of the next century.

1983 seems to be a much better year to judge the value of medium to long-term forecasts than, say, 1979 or 1980. The historic price explosion during that earlier period, together with the outbreak of the Iran-Iraq war, affected all judgments regarding future market developments to the point where most other factors paled next to the perceived impact of these events on future prices in almost all forecasts. By 1983 the situation had changed significantly towards a more balanced market in which non-extraneous factors again played a visible role. Thus, Iran and Iraq had both resumed exports on a significant, though still reduced, scale, OPEC production had dropped for the 4th consecutive year from its 1979 peak of 31 million B/D, with most members participating in the decline, and prices had dropped for the 3rd consecutive year from their historic high of 1980.

Forecasters could read two opposing messages into this development: (1) OPEC was still in control of prices since it was still able to command a price ten times as high as in 1972 and twice as high as 1978, the year before the second price explosion, even though demand for OPEC oil was now lower than in 1978 and excess capacity continued to climb; or (2) OPEC was in the process of losing market control since both its imposed unit price and its export volume were steadily declining, something which obviously was against every member's self-interest.

In 1983, the mirror reflected OPEC's continuing command position but the telescope would have shown a downhill slope

In terms of our two forecasting instruments, in 1983 the mirror reflected OPEC's continuing command position in price setting, while the telescope should have shown that OPEC's pricing power was on a downhill slope. As we know, of course, most forecasters thought the mirror image was the key to the future. The vast majority of forecasts in 1983 projected an *increase in real* world oil prices throughout the remainder of the 1980s and beyond.

Most industry price forecasts for 1990 fall within the range of the U.S. Energy Information Administration's "Low, Middle and High" scenarios, shown in its *Annual Energy Outlook, 1983*.[1] Its three price projections for 1990 were $29, $37 and $46 in real (1983) dollars and $42, $53 and $66 in nominal dollars. All three scenarios projected further increases in real dollars from 1990 to 1995. The actual price in the first 7 months of 1990 (before the Iraqi invasion of Kuwait) was $17.66 which is 60% below the lowest nominal price in the 3 forecasts!

Mesmerized by OPEC, the price-meister in 1983

What caused this total misreading of the price trend? It was largely that most forecasters had become completely mesmerized by OPEC's apparently unchallengeable pricing power and, hence, subordinated standard economic supply and demand considerations to the perceived new price master in their forecasts. Given the fact that OPEC had succeeded twice in less than 10 years in tripling its oil price and keeping it there, this was an understandable reaction to a totally new reality. One lesson we learned from this was that the reality of the market never becomes obsolete. Market forces can be temporarily suspended but they inevitably reassert themselves over the long-term.

Another aspect influencing forecasts in 1983 was the then-still-prevailing idea of a coming constraint of non-renewable resources, including oil. For instance, the highly respected Club of Rome Group, in its 1972 publication *Limits to Growth*, calculated that under very optimistic resource assumptions world oil reserves would last another 50 years, with supply constraints appearing long before then. The reality has of course not borne out these predictions. World crude oil reserves have risen during the 20 years since 1972, both in actual volume and relative to production. We have found more oil during this period than we produced. And our finding effort was limited by commercial and financial considerations, not by resource limitations.

Resource constraint predictions: mirror, not telescope

The resource constraint predictions of the time also represented a mirror reflection rather than a look through the telescope. Forecasters were overwhelmed by the economic growth rates of the 1950s and 1960s, which were really unique in that they reflected largely the global post-World War II recovery period and not a long-term secular trend. World oil demand was growing at an annual rate of nearly 6% from 1950 to 1972. Forecasters could calculate that even if the rate were cut in half for the next 20 years, world oil demand by 1992 would still have risen to 95 million B/D. Could we have produced 40% more oil last year than we did? Probably not. Thus, the concern about a resource constraint in the 1990s was not unreasonable at the end of the 1960s, unless one made some brave assumptions about the end of the post-war recovery period as well as future oil prices.

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[1] The delivered cost of imported crude oil to U.S. refiners.

Of course, by 1983 it was clear that a sea change in oil's growth rate had taken place. From 1979 to 1983 world oil demand actually *declined* by 15%. This should have moved "resource constraint" back into the category of hypothetical concepts. However, it was still given weight in long-term forecast analyses in the early 1980s.

Onward to 2000 and 2010

Let us now look at some published current forecasts from 1991 to 2000 and from 2000 to 2010. We looked at the Base or Reference Cases of six published forecasts[2] and found that for both periods all but one forecast show increases in *real* prices, ranging from modest to fairly steep. One forecast shows flat real prices. A summary of the six forecasts (in '92$) shows a price range of $20-27 for the year 2000 and $26-$38 for the year 2010. The average of the six forecasts is $23 for 2000 and $29 for 2010. The price in 1991 was about $19.50. By 1992 it had fallen to about $18.30.

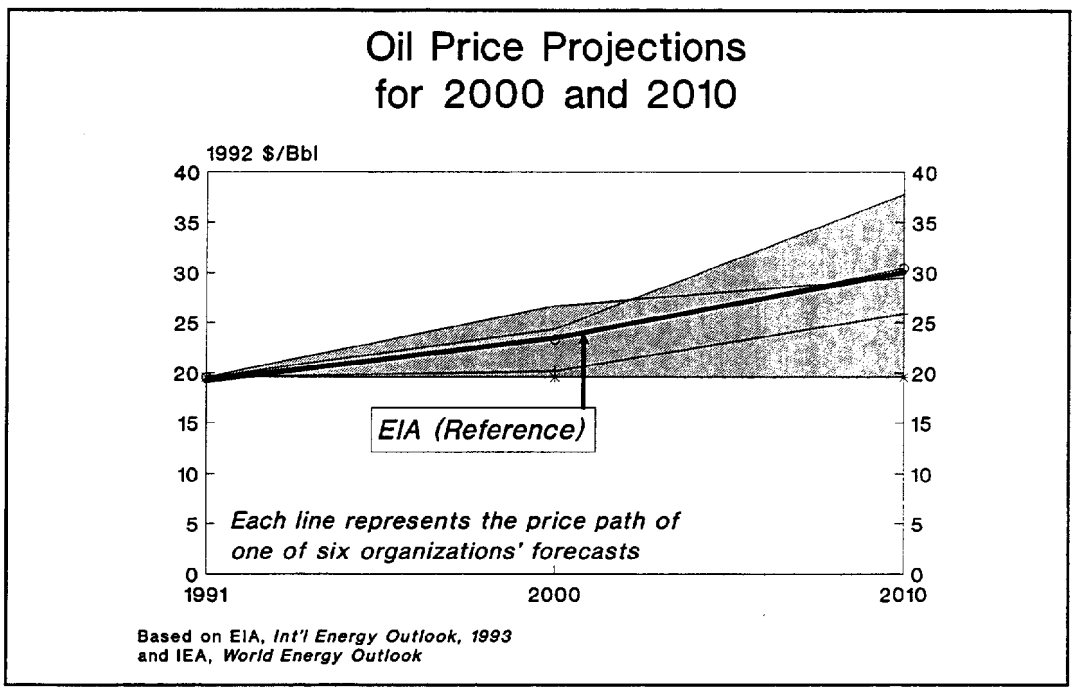

Figure 1

It is interesting that most of these forecasts represent significant downward revisions in prices from the previous year's forecast in recognition of changing market conditions. Yet, the new price forecasts do not represent a mirror reflection of the recent past or current situation. Instead they seem to assume a modest revival of OPEC's pricing power. The forecasts project only a small increase in demand during this period: 1.4% - 1.8% annually for

[2] U.S. Energy Information Administration, *International Energy Outlook, 1993*; the four other forecasts cited in the *Outlook* (p. 16) for comparison purposes; International Energy Agency, *World Energy Outlook to 2010*, 1993.

the period 1992-2000 and 1.2% - 1.3% for the period 2000-2010; they indicate no supply constraint but a steady rise in OPEC's share of world production. Hence, the projected price increases appear to be based on OPEC's ability to raise prices. Several of the forecasts make explicit reference to OPEC's importance in future price determination.

OPEC Irrelevant?

A look into the mirror does not support this future price path: OPEC's relatively moderate price target of $21 set in July 1990 was never approached, even in nominal dollars in the 2 1/2 years since the end of the Gulf War. The price weakness remained despite the continuing effective sanctions on Iraq's exports and Kuwait's much reduced exports until mid-year 1993, and even though OPEC operated at 90-95% of capacity throughout this period, compared to 70-75% in 1989. True, economic recessions in Europe, the U.S. and Japan have curbed oil demand. Nevertheless, excluding the FSU, (Former Soviet Union) world oil demand has risen modestly in each of the last three years while FSU net exports declined. Yet, the OPEC basket price fell every year, from $18.66 in 1991 to an average of $17.20 in the first 8 months of 1993. So, the mirror tells us that OPEC has really become a very ineffective organization. Many oil market analysts have in fact drawn that conclusion.

OPEC Still Matters

Yet, there is another way of looking at OPEC's impact on the market and it leads to quite a different conclusion. Where would oil prices be now if OPEC had disintegrated or dissolved in the aftermath of the Gulf War and no other international price setting mechanism had replaced it. Prices in a truly free market (granted, a theoretical concept) are determined by the marginal production cost. For oil this could well be half the current price, perhaps even less. Such a price would be way below the replacement cost of oil but would still give most operators a positive cash flow. OPEC is currently the principal institutional factor keeping world oil prices at a high enough level to permit replacement of depleting reserves even in relatively high cost areas, such as the U.S.

Thus, OPEC is far from irrelevant. In fact, following the international companies' loss of concessions in the major oil exporting countries and the global commoditization of oil through the international futures exchanges, OPEC has become the only institution able to perform the function of keeping prices above the hypothetical free market level and it is of vital self-interest for it to do so. For the OPEC countries the price of oil must include the externalities -- or perhaps they should be called "internalities" -- of most of the revenue required to support their countries' infrastructure, including social services, military expenditures, etc. In an uncoordinated free market these very substantial supplements to the production cost could not be incorporated in the price. Yet, for the governments of countries whose principal source of income is oil exports, these supplements are literally vital for their political survival.

It would therefore be quite wrong to dismiss OPEC as moving towards irrelevancy in world oil price formation. However, whether OPEC can move prices up in real terms along

the projections made in the forecasts I have cited is another matter. Looking into our telescope we see any upward trend in real prices more likely in the second half of our forecast period, 2000-2010, than between now and 2000.

Challenges loom large

Over the next few years OPEC's established inability to effectively coordinate production quotas is likely to be the principal factor in preventing any sustained real, perhaps even nominal, price increase it could otherwise obtain. A major new destabilizing factor would be Iraq's return to the market. Right now this seems a likely, though by no means certain, development in 1994-95. If it is the result of the removal of U.N. sanctions, which is what Iraq is clearly aiming for, the export volume could start with 1.5 million B/D and fairly quickly move up to the immediate pre-war level of 3 million B/D. Iraq, even more than Kuwait, will surely want to maximize its exports, particularly since roughly a third of its revenue will be siphoned off for reparations. The rest of OPEC can only cope with this problem by cutting its production by 8-10%. If the alternative is an inevitable price collapse it may well find an effective formula to do so. But overall, the end of the U.N. sanctions on Iraq must be viewed as having an extended negative impact on prices because of Iraq's stated intention to expand its production in the post-sanction period as rapidly as possible above its pre-war level to make up for its losses.

Another potentially negative factor for OPEC could be net oil exports by the FSU. OPEC benefitted significantly from the decline in FSU exports from 4 million B/D in 1989 to 2.3 million B/D in 1992. But the decline seems to have leveled off and with the urgent need for foreign exchange and the likely modest increase in production in the second half of the 1990's, FSU exports could well increase again after 1995. This seems to be the intention of Russia's current oil managers.

Forecasting a real price increase by 2000 requires producers' optimism

Of course, world oil demand will grow throughout this period. The average of the six forecasts shows an increase of almost 9 million B/D from 1992 to 2000, 2/3 to 3/4 of which can be expected to be supplied by OPEC. Yet, by 2000 the organization will still have a significant, though manageable, excess producing capacity. Under these circumstances a forecast of an increase in <u>real</u> prices by 2000 from the 1992 level has to be laced with a good bit of producers' optimism.

All of the six forecasts show significant further increases in demand in the first decade of the next century, ranging from 7 to 15 million B/D. A real price increase in that period is more likely than in the period to 2000 since the bulk of the incremental supplies will again have to come from a few OPEC members, although one or two newcomers, such as Kazakhstan, are also likely to contribute.

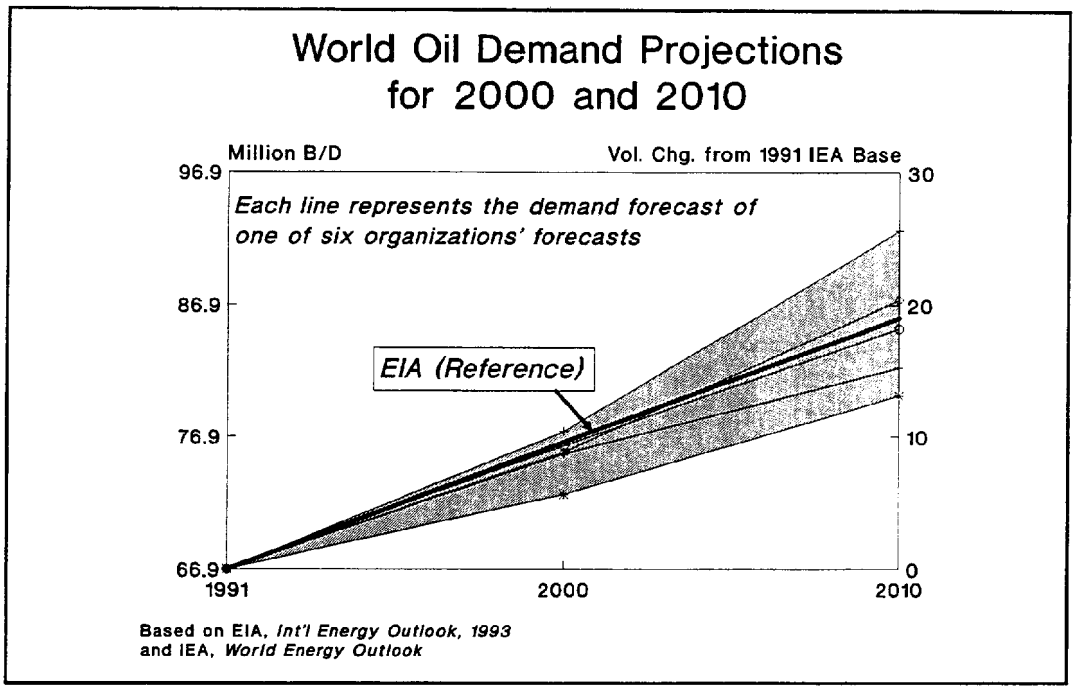

Figure 2

Viewed from this year's level of 67 million B/D, a world demand of 86 million B/D by 2010[3] may appear awesome, even though the annual growth rate is relatively modest, as pointed out before. There are obviously innumerable uncertainties with a global outlook that far ahead. I would like to briefly address one of these, since it is frequently brought up in current debates over the long-term oil trend: Will there be enough capital to finance the required expansion in oil producing capacity?

Enough capital for oil productive capacity?

The question becomes more pertinent in the second segment of our forecast period than in the first. The capacity for the 9-10 million B/D projected world demand increase from 1992 to 2000 is likely to be in place by 1996 or 1997 if the sanctions on Iraqi oil exports are removed by then and no major new extraneous event curbs production again. Thus, ongoing expansion projects plus firm plans for more, all based on current prices, should provide the required supply by 2000. Of course, a significant further drop in prices could cause a downward revision of some of these plans. However, much of the expansion in the OPEC countries to 2000 will consist of development operations in existing fields or bringing fields already discovered into production. For countries with a Reserve/ Production ratio of 50-100 years these represent very attractive investments under any realistic price assumption.

[3] The average of the six forecasts.

Thus, from now to 2000 the mirror view of adequate capital for OPEC to maintain a continuing, though declining, surplus capacity in the face of rising production is likely to be correct.

For the subsequent 10-year period the situation is different. Under a pessimistic, but not unrealistic, assumption for non-OPEC production in the next decade, OPEC may be required to supply most of the 10-12 million B/D increase in world demand. This would require an OPEC productive capacity of some 45 million B/D by 2010 if there is to be excess capacity to maintain some flexibility in the delivery system. The cost of this expansion will surely be higher than the capacity expansion of the 1990's, both because the increase is larger and the cost per barrel will be higher since more of the increase will have to come from new fields and less from development drilling in existing fields.

If OPEC capacity requirement is 45 million B/D by 2010...

Some OPEC members may not be able to fully self-finance their capacity expansion, for there will be simultaneous claims on oil revenues for other purposes. One such claim is the need to upgrade the industry's infrastructure which has been neglected in several major OPEC countries while all attention focused on increasing production. Another is the need for more downstream investment to meet the rapidly growing (subsidized) domestic oil demand; finally, and perhaps most importantly, there is what has been called "the revolution of rising expectations" which requires a greater share of the developing countries' oil wealth to be spent on social programs and other national interest expenditures outside the oil sector.

All this means that internal self-financing may be insufficient to meet the upstream expansion foreseen in the next decade. However, capital availability is not limited to domestic sources. In all OPEC member countries the oil industry was started, developed and operated by foreign capital until nationalization took place. The same companies, as well as many others, are quite interested in investing again in these countries' oil production. U.S. oil companies in particular are shifting their upstream spending from domestic to foreign areas because of the steadily declining accessible resource base in the U.S. This is true not only for the major companies with a traditional emphasis on international operations but now also for the larger independents whose traditional territory was the U.S. and Canada. Thus, from an economic point of view there should be no capital constraint on the investment needed to raise OPEC's capacity level if foreign companies can participate in this development through joint ventures or other arrangements with the countries' national oil companies.

Self-finance or foreign investment?

However, as is so often the case, politics interferes with economics. Some countries, including OPEC's super-giant Saudi Arabia, still do not permit any foreign investment in their upstream oil sector; others have offered initially unattractive terms. In some countries there are also political constraints on investment imposed by the companies' home country. Nevertheless, the trend is clearly in the direction of more joint ventures in OPEC's upstream sector because of the attraction to invest

in a commodity whose demand will grow well into the next century and whose production cost (in the major OPEC countries) is only a fraction of its sales price.

OPEC's rising share in world production together with the likelihood of some constraint on the inflow of foreign capital makes a real price increase in the first decade of the next century more likely than in the remainder of this decade. However, we are talking about probabilities -- not certainties or even near-certainties.

Yet, there is one near-certainty: the growth in world oil demand will continue well beyond the first decade of the next century. Here I think we can trust our telescope, despite renewed recent discussions about the end of the oil age. A major magazine article shortly after the start of the Gulf crisis was entitled "The Beginning of the End for Oil."[4] I would like to say that while oil consumption may level off in the U.S. and Europe in the second half of the next decade, demand in the developing countries, the former Soviet Union, Eastern Europe and China will grow sufficiently to more than offset any decline in the OECD area. For some of these countries the oil age is just beginning. Take China, a rapidly industrializing nation with a ratio of two cars per thousand people, compared to over 300 per thousand in Japan. In most of these countries the growth will be carried primarily by transportation fuels -- ground and air. This will have significant long-range implications on the refining industry supplying these markets.

The lost horizon of secular demand decline

Environmental policies affecting the quality and consumption of oil products will in practice carry a relatively low priority in the developing and industrializing countries whose first priority for the foreseeable future will be economic growth to reduce poverty. In some of these countries a move towards oil in stationary energy consumption will in itself represent an environmental improvement over the use of coal or wood.

In the industrial countries, oil's contribution to global warming and ground level pollution is of course taken quite seriously and action to reduce it is already underway and will accelerate. However, the action is primarily designed to improve the quality and/or curb the consumption growth of existing oil products, not replace them by other fuels. Environmental policies will be one of the reasons for the eventual levelling off in oil consumption in the OECD area. But, as pointed out, this will be more than offset by the continuing growth in the rest of the world.

So, let me close with a prediction: nobody in this audience will live to see the secular decline in world oil demand. And I wish you all a very long life.

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[4] Fortune, September 10, 1990, p. 35.