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By

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M.I.T. World Oil Project
Working Paper Number MIT-EL-78-008WP
May 1978

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M.A. Adelman and Henry D. Jacoby

During the debate on U.S. energy policy, the international setting has been provided by a set of government and private studies of future world oil supply and demand. Though they differ on particulars, nearly all paint a common picture. Some day, like Old Mother Hubbard we will go to the cupboard and find it bare. The result will be a sharp, perhaps devastating, international crisis. There will be a wide gap between world needs and oil production, and consumers will be drawn into a "physical scramble" for "inadequate" supplies.

These projections are seriously flawed. They pay no attention to how markets work. More particularly, they ignore the oil cartel and its likely price-setting behavior, and the resulting effects on demand. Hence they are misleading guides to the nature of the troubles to come, and to the choice of policies to deal with them.

1. The Oil Gap

The general format of these analyses is illustrated in Figure 1. Assuming a constant price for world oil, and some rates of growth in the

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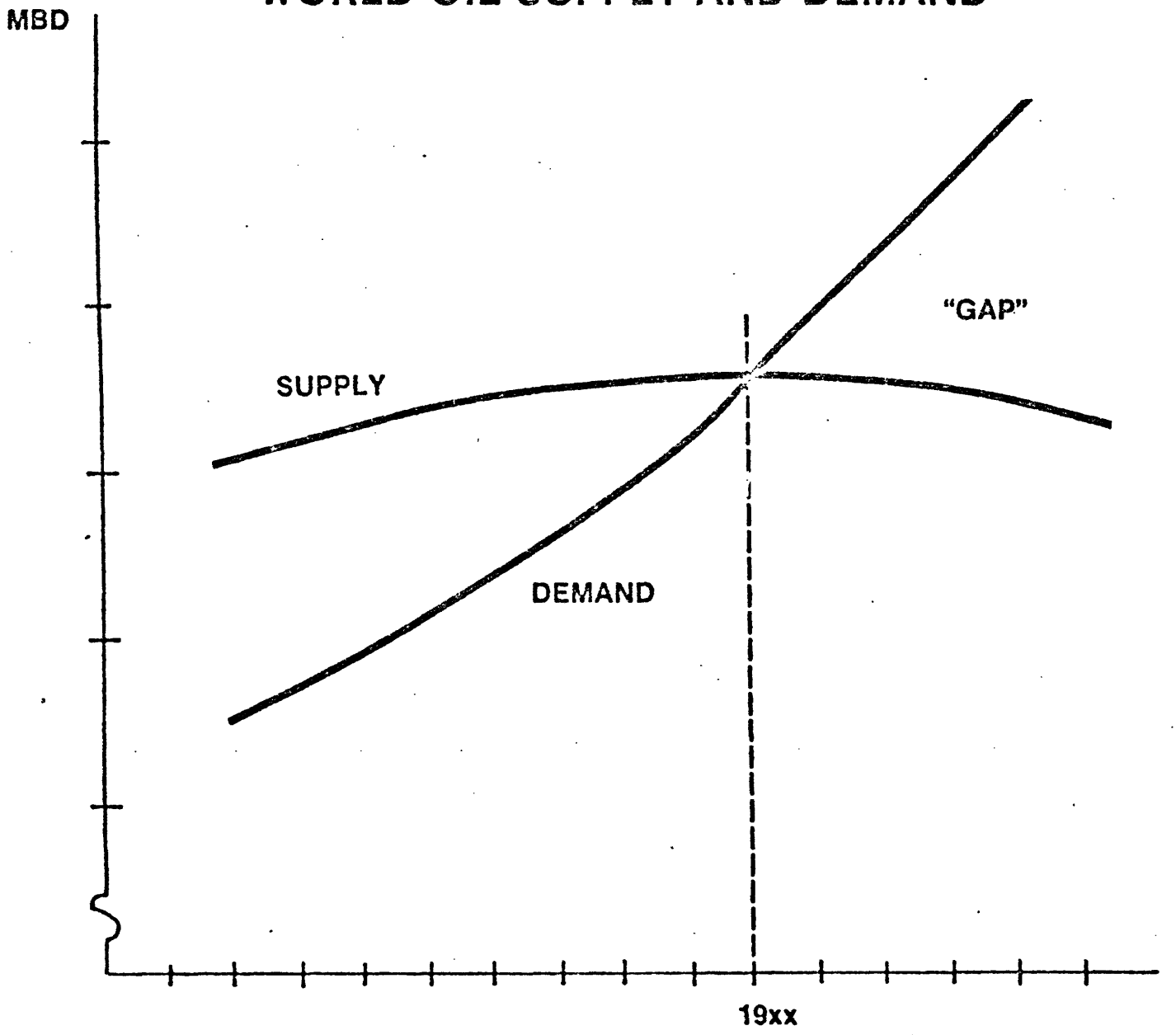
*This research has been supported by the National Science Foundation under Grant No. SIA75-00739. However, any opinions, findings, conclusions or recommendations expressed herein are those of the authors and do not necessarily reflect the views of NSF. The work also is supported by the M.I.T. Center for Energy Policy Research.

FIGURE 1

WORLD OIL SUPPLY AND DEMAND



Assumptions:

- Constant real price of oil
- Healthy growth.

importing economies, world oil demand is forecast. Usually this is done country-by-country for the major importers, and for regional groups of smaller consumers. Corresponding estimates are made of the likely supply of oil, based on estimates of resources, and guesses about the exploitation policies of producing nations. The likely oil supply in countries outside OPEC is subtracted from the total world demand to yield a net demand for oil from the cartel.

This net demand is then compared with estimates of available production capacity in the cartel countries. There is considerable excess capacity in the cartel now; but given smooth growth and constant real oil prices, this excess dries up and at some point a "gap" appears.

The results of five studies of this type are summarized in Table 1, along with some results of an M.I.T. project which can be put in the same form. In 1976 the net demand on OPEC was 31 million barrels per day (MBD), whereas capacity was around 38 million. The forecasts of the various studies are fairly close for 1980, with an excess capacity of some 8 to 13 MBD. By 1985, however, the studies vary greatly. The CIA study [1], the most pessimistic of the lot, computes a "gap" of 11 MBD by 1985. The Congressional Research Service [2] forecasts excess capacity into the late 1980s as does the International Trade Commission [4]. The anonymous oil company [5] simply sees no shortfall. The WAES study [7] presents several scenarios, wherein the "gap" appears as early as 1980 or as late as the late 1990s depending on the assumptions. The mid-values of the WAES scenarios yield essentially the same results as the CIA study, only five years later. One WAES calculation with constant growth and prices shows a "gap" of 20 million barrels per day by the year 2000.

TABLE 1

1985 PROJECTED OIL CONSUMPTION AND OUTPUT, ASSUMED CONSTANT PRICE (MILLION BARRELS DAILY)

	Actual		Projected 1985					
	76	77	CIA	CRS	ITC	WAES	OIL CO.	MIT**
WORLD CONSUMPTION (Excl. Communist Areas)	48	49	70	69	65	58-63	60	59
NON-OPEC SUPPLY	17	18	21	26	33	22-25	26	21
(Incl. Communist Exports)	(1)	(1)	(-4)	(1)	(1)	(*)	(*)	(1)
NET DEMAND ON OPEC	31	31	49	43	32	36-39	34	38
OPEC CAPACITY	38	39	38	48	39-59	33-39	> 34	43

*Assumed 1 MBD

**Preliminary results from MIT World Oil Project. This Base Case assumes constant drilling rate, healthy world economic growth.

One could, with some effort, view these calculated "gaps" as merely an analytical device, not a forecast. That is, one might assume a constant price to show it is impossible: demand will greatly exceed supply, hence the price must rise. Indeed, using the results of these studies one might assume some set of demand elasticities for the short and long run and compute a rough estimate of the price jump needed to equate demand and supply.

But our observation of these studies, and the way they are being used in policy discussions, reveals that the "gap" is not really notional--not just a way of approaching the market-clearing process. The repeated warnings of "catastrophe," "disaster," "massive energy crisis," reflect something more than a possible high price for energy. Decision-makers are led to expect a real physical shortage, a magnified version of the winter of 1976-77, when throughout large regions of the U.S. there simply was not enough natural gas at any price.

The lessons of 1976-77 are clear, however. The price of natural gas had for many years been held below the market-clearing level. This disequilibrium was briefly reinforced by an unexpectedly cold winter. Other such shortages have come and gone. Nobody can expect a future long-term gap unless one postulates sellers deliberately holding the price to much less than the traffic will bear. One searches in vain for an explanation of why or how, in any competitive or monopolized market, sellers should insist on giving away a large fraction of the revenues available to them. The mind reels before a vision of producing nations holding the price line, and forcing a shortage in consumer countries, which yields huge windfall gains to refiners and marketers.

Yet this arbitrary assumption seems to have firm hold on the minds of decision-makers everywhere. One cannot begin to count the number of anxious

references to the need for "access" to crude oil, and worries over its "availability." The drive for energy self-sufficiency, incessantly confused with the safeguards against sudden interruptions or cutbacks, makes no sense unless one expects price to be held down to force demand to exceed supply. In this mythical world of physical dearth, since price is not distributing the oil, it will go by favor and influence. Hence the alleged need for political rapprochement; North and South; etc. Since the penalty of physical dearth is much greater than merely paying a higher price, it makes sense to spend lavishly, cost what it may, on synthetic fuels, renewable energy sources, or whatever, to "close the gap." Yet in fact, whatever the future price of oil, we can be sure that at that price anyone who can pay will have all he wants. And the people who are cooperative but cannot pay will get nothing.

The misnamed "embargo" of 1973-74 was a production cutback, and the price was forced up. Reductions of oil imports were roughly 9 percent for the French, and 14 percent for the Americans. In theory, in any place where total supply (imported plus domestic) diminished more, the price would increase more. The higher price would be a magnet to draw in more supply until prices equalized. Hence, the reduction in total supply should be approximately the same everywhere. This, so far as we can ascertain, is what actually happened.

The delusion of a "gap" corrodes the goodwill and mutual trust between the United States and its friends, since everyone fears being left out in the game of musical chairs. This fear is expressed clearly in a Rockefeller Foundation study [6] which foresees a "competition among governments" which would be tempted to take "all possible measures to try to assure for themselves adequate supply."[1]

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[1] The Rockefeller study is concerned not only with physical shortage, but with the financial and growth implications of rising prices, of which more below.

The resulting wish for self-sufficiency leads to other problems--for example, the strong pressure to adopt breeder reactors and nuclear reprocessing plants. For reasons that are beyond the scope of this paper, the U.S. Administration has urged its friends to delay the building of such plants. But "for Japan and West European countries, most of which lack large supplies of coal and oil, the ... breeder reactor is the principal hope of obtaining adequate energy supplies."[1] The key word is, as usual, "adequate," not lower-cost. American assurances of future nuclear fuel supplies for other nations accord poorly with the refusal to ship Alaskan oil to Japan. Nothing but good could result from such sales, since there would be a substantial saving in transport cost, and the Alaskan oil would be replaced by other sources. Were there no delusion of physical shortage impending, the refusal would appear as senseless as in fact it is.

It is ironical that the doomsday predictions of a gap--for example, Secretary Schlesinger's warning of "a major economic and political crisis in the mid-1980s as the world's oil wells start to run dry and a physical scramble for energy develops"[2]--may actually lead to an unwarranted complacency about the real strains to be visited upon the world economy. For as the gap looks more remote in time, the warning of "a gap--therefore a price surge" will become the reassurance of: "no gap--therefore stable prices." This is equally false. We should put away gaps and look at the market.

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[1] New York Times, October 4, 1977, p. 53.

[2] New York Times, October 6, 1977. The same phrase, "scramble for scarce petroleum supplies" occurs in the Wall Street Journal, October 7 and in a New York Times editorial, same day.

2. Likely Cartel Behavior: Avoiding a Crisis

The members of the oil cartel now set the world oil price, with two main objectives. First, they must avoid major political risks--particularly those which would accompany an oil-induced world financial crisis. Second, they attempt to get the most value for their own societies from their oil and gas reserves. (Each individual country may have a host of other political, military and economic objectives. But these objectives are all served by greater wealth and need not be separately considered here.)

Consider, in the light of the first objective, the CIA forecast of an upward price "break" in 1983, when the gap first appears and the amount demanded exceeds capacity [1]. No cartel nation could control the price if production ceilings were fixed; with self-fulfilling expectations leading to ever stronger bidding for limited supply, control might be lost for years. International cooperation and sharing mechanisms would be likely to break down. Consumer-country reactions might be drastic.

The direct damage of the uncontrolled price rise would be substantial, the indirect effect much worse. Importing nations would take strong contractionary measures to offset unheard-of balance-of-payment shocks, as well as inflationary impacts.

Some Illustrative Simulations of the "Crisis."

As we think through the likelihood of such a sequence of events, it is helpful to be able to calculate the implications of various assumptions about them. For this purpose, we can use preliminary results from a set of studies of this market carried out by the M.I.T. World Oil Project. The M.I.T. simulation model underlies the far-right column of Table 1. Before looking at results, we should give a brief indication of how these calculations are put together.

Oil Demand. Consumption estimates are based on a 17-region econometric model of world oil demand. The assumed GNP growth rates range from 5 percent for Germany and Japan to 3 percent for Britain, with the United States at 4 percent. Our research indicates that the effects of higher prices on energy consumption are strong, but slow, taking roughly 14 years to work out three-fourths of their ultimate effects, because the stock of energy-using capital must be changed and/or replaced. Hence higher prices of the recent past have done little so far to restrain consumption, but the effects would go on for years even if there were no further price increases. Furthermore, real prices to the consumer, adjusted for inflation, have so far risen surprisingly little. This damping of the price effect is due chiefly to the maintenance of consumer-country taxation at relatively stable levels. In 1972, in Western Europe, taxes were over half of the retail value of oil products; in 1976, hardly over a third. In our calculations, future consumer taxes have thus far been held constant, but we will return to the subject later.

Oil Supply. The supply estimates come from a 39-region model of oil exploitation. The model is based on analysis of the creation of proved reserves by development drilling and of the subsequent supply from these reserves. The key variable in the analysis is the rate of drilling, and in the calculations shown here we make alternative assumptions of a relatively constant rate (which is a safe floor) and of an annual 5 percent increase (which is less than the actual recent increase). We continue to work on methods to identify those areas where development drilling may be price sensitive, and to capture the likely response. But, in effect, we assume here that higher prices have so little effect on supply that we are better off ignoring them.

This assumption of a zero price effect is a provisional attempt to register the net result of two obvious phenomena: higher prices increase supply in some countries; elsewhere they lessen supply (i.e., we observe "backward bending supply curves"). To see this latter response, consider first the "price-taker" countries, non-members of OPEC (and some OPEC members) who are--mostly--uninhibited in using their installed capacity. In the United States, the revulsion against the "obscene profits" allegedly earned by oil and gas producers has prolonged price controls on gas and produced them on crude oil; hence drilling effort, though impressively higher, is less in quantity and quality than it would otherwise be. In Canada, the attempt by provincial and federal governments to tax away somewhat more than 100 percent of the windfall gains led to the strange sequence: higher prices--much higher taxes--and less investment in oil, as drilling rigs headed out of the country. Things have changed considerably there, but the cautionary tale, of higher oil prices cutting down on investment, is repeated with infinite local variation in many other lands.

Private investment in oil has become increasingly risky--a company loses if it finds nothing, and is expropriated in fact (whatever the form) if it finds much. Contracts for mineral exploitation have very little force since they were used for bonfires in 1970-1973. In countries like Malaysia, Indonesia, and Brazil there has been no expropriation, but terms have been unilaterially revised by governments; in some cases they have overreached themselves, and are now retreating in order to promote exploration. Abundant income shields a country from the need to change policies, perhaps losing face. Poorer countries tend to be more flexible. Last fall, Malaysian planners were hesitating between the fixed idea "at

the present rate our reserves will last no more than X years" versus "raise oil production now and worry about the future later."[1]

In the North Sea, Norway has restricted leasing to limit oil revenues, and higher oil prices would make them restrict even more. In the United Kingdom, the beginnings of a large flow of oil revenues have revived the dormant threats to put a ceiling on output. Long-term sales contracts have recently been forbidden, and the government wants most of the oil refined at home rather than exported.

Private investment in oil exploration and development is, therefore, under some strong inhibitions. So is government investment. In Mexico, the state oil company has scored a tremendous success, and probably has the potential to outstrip any Middle East country except Saudi Arabia. But these resources must first be transformed into reserves by drilling, and the government must decide on the rate. The price explosion made it easier to reach a revenue target, and leave oil in the ground longer; it also made accelerated production much more profitable. Hence it provided ammunition both for those who would expand output faster, and for their opponents. In 1976, the goal was 7 million barrels daily--in the year 2000. In 1977, the head of Petroleos Mexicanos said: "Our task is to develop gas and oil for export as quickly as possible to generate foreign exchange." This is important, and may, or may not, be policy five years hence.

In Venezuela, the reserve base shrank in the last decade of private ownership, 1965-75. We can understand why there was little exploration. But since nationalization there has been even less. The surge in revenues

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[1] New York Times, September 5, 1977.

has dulled the public awareness of declining reserves. New-field exploratory wells drilled in Venezuela in 1973, 1974, 1975 and 1976 were respectively 10, 6, 1 and 3. But in 1977, there was not a single rig drilling for a new-field discovery. Aside from discoveries: the immense hydrocarbon accumulation of the Orinoco heavy oil belt, which may contain more usable oil than the Persian Gulf, can only be changed from a geological curiosity to an economic asset by much more investment in research and development than has been forthcoming.

Possibly Venezuela is starting to turn the ship around. Planned exploration outlays in 1978 will be 150 percent larger than in 1976, and may in time increase by a factor of five.

These examples explain why the ultra-high oil prices have not set off a worldwide burst of investment. Outside the U.S., drilling activity has not boomed, and even decreased from 1975 to 1976. Offshore mobile rigs, a pretty good index of exploration, have about doubled in five years, and the increase has leveled off: solid, not spectacular growth. This results from the fact that governments are, directly or indirectly, making the important investment decisions. A comfortable (or at least bearable) excess of receipts over disbursements fulfills commitments, and promotes consumption, but dulls the pressure to invest for more oil. The foreign exchange deficit on current account is often a better predictor of investment policy than is risk-discounted profit. Therefore, our drilling rate scenarios are, given our current level of understanding of these government policies, about the best that can be done at present.

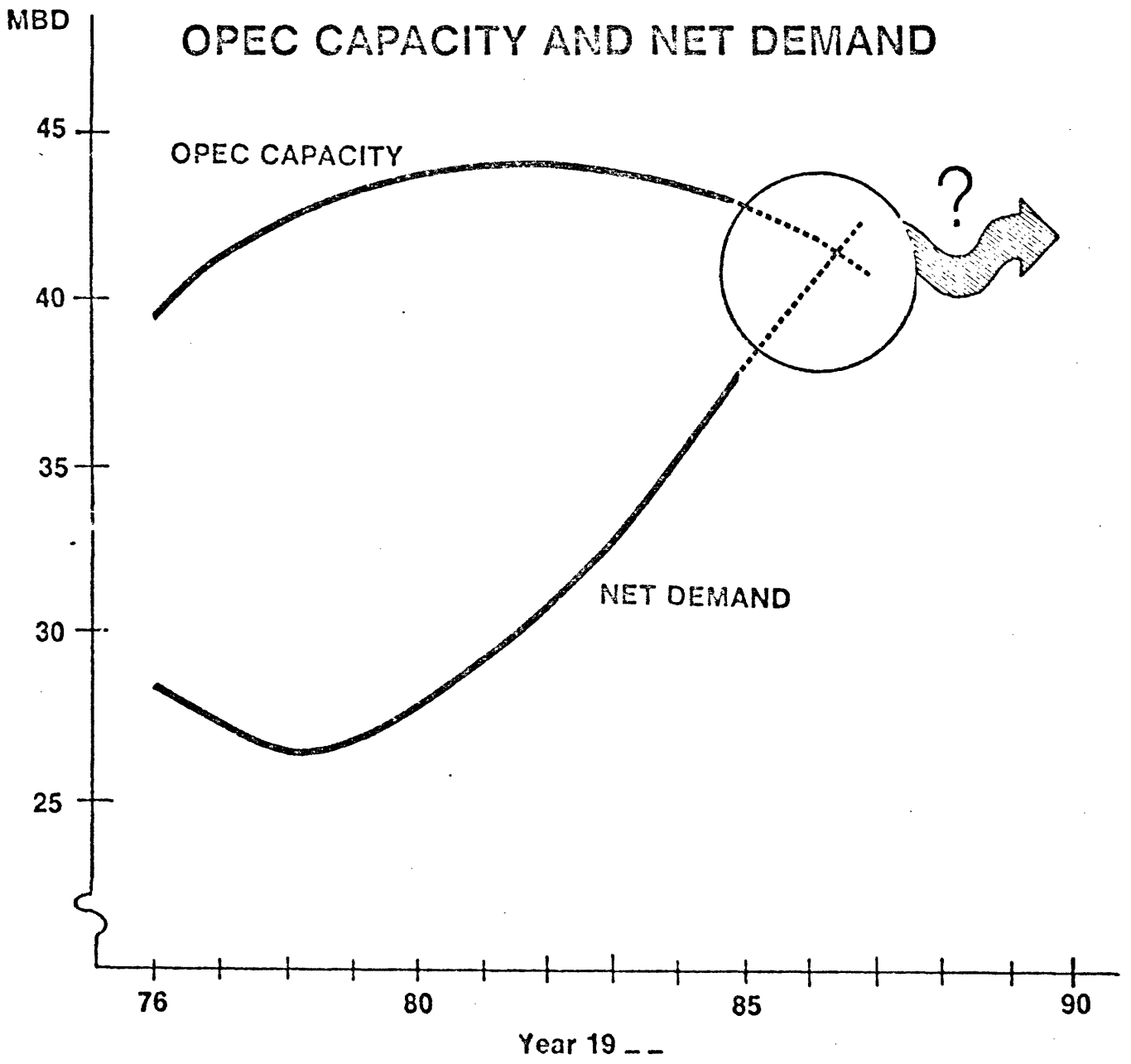
Likely Market Developments. We have combined our analysis of world oil demand and studies of capacity creation and ultimate supply into an overall model for simulating market developments. If we make the relatively

conservative assumption of constant drilling rates, and assume constant oil prices and healthy economic growth rates, the result is as shown in Figure 2. Some time in the late 1980s, under these conditions, the excess supply in the cartel dries up; net demand is rising strongly with no response on the supply side.

Obviously something has to give. If we assume that the cartel in fact tries to hold price constant right up to the crossover point (which, we shall argue below, is unlikely), and if in fact OPEC can control the price in these years (which is not likely either), then what happens is the "price break" put forth in the CIA study [1]. It is hard to form any accurate estimates of what might happen in such a circumstance, but in Figure 3 we show a plausible scenario. When excess capacity dries up, the price jumps from $25 per barrel in two years and then comes back down to $18. Such a price "break" in 1984 has only a mild damping effect on consumption (solid line), because of the slow response mentioned earlier. Hence the mythical crossover and the real phenomenon, the beginning of market tension as consumption approaches capacity, are postponed for only about two years.

We also have scant basis for estimating the effects of such a strong price jump on worldwide growth rates, though there is widespread agreement that a doubling of oil prices and revenues would lead to a much greater increase in the OPEC surplus, and would be likely to precipitate a recession, as countries attempted to bring their balance of payments and domestic inflation under control. We hypothesize a recession much like the one following 1973: a 3 to 5 percent decline over a period of two years, and with full recovery requiring four years. This is shown by the dashed line in Figure 3.

FIGURE 2

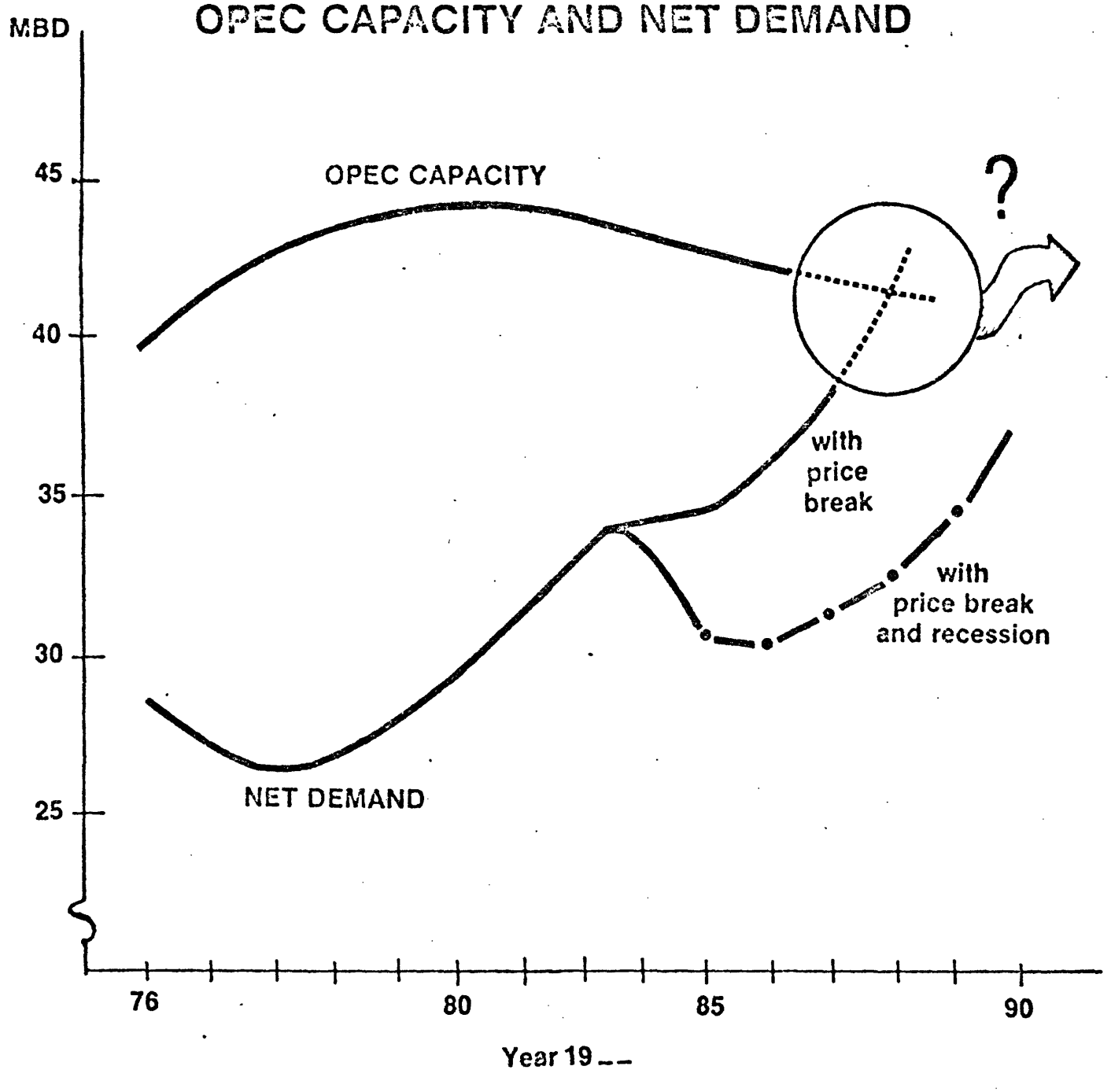


Assumptions:

- Constant real price at $12.50 (1977 prices).
- Healthy growth.
- Constant drilling rate.

FIGURE 3

OPEC CAPACITY AND NET DEMAND



Assumptions:

- Price break. Price jumps to $15 in 1984, $25 in 1985, and returns to $18 by 1987.
- Recession. No growth in 1984, negative 3-5% in 1985, returning to base growth level by 1990.
- Constant drilling rate.

Now, why should cartel managers precipitate such a crisis? In whose interest would it be? Smaller exporters might benefit to some degree through the dramatic short-term increase in revenues, but the overall disruption of the international system would appear serious enough to restrain even their interest in such a price jump. For the Saudis and their immediate partners, there might be losses on investments in consuming countries. There would be grave political risks which cautious managers would give much to avoid. They would be well advised to push any available capacity into the breach to hold down a price rise.

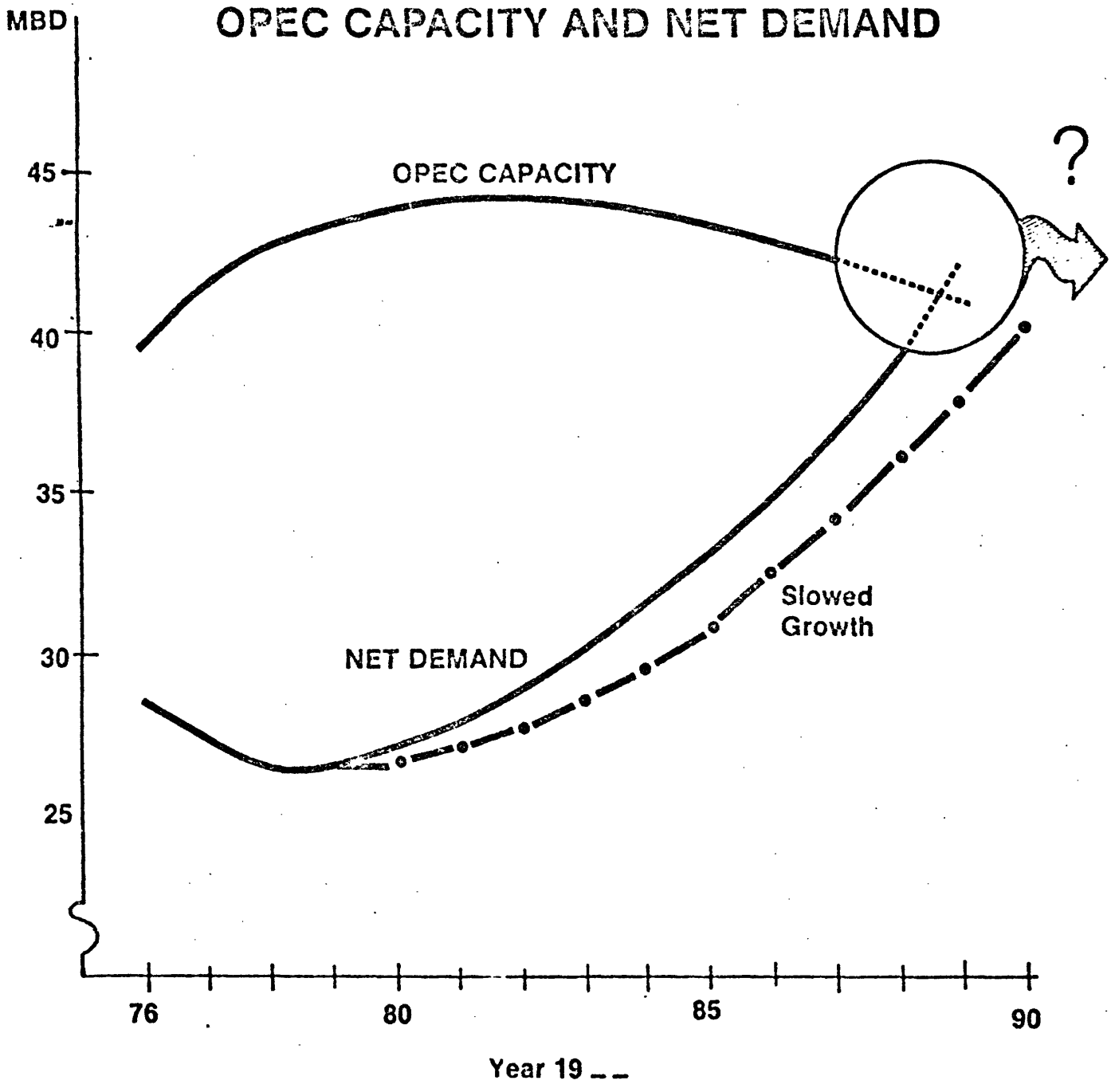
The implication is clear: to hold oil prices constant right up to the point where excess capacity is gone forces an international crisis and is of no advantage to anyone. The best strategy for the cartel would be to begin to raise prices earlier in order to give time for the long time lags in supply and demand to work themselves out.

Figure 4 embodies our view a more likely view of OPEC response. The cartel has unexerted price raising power, but approaches its limits cautiously, one step at a time, concerned not to upset world financial applecarts. Accordingly Figure 4 shows prices rising steadily (in real terms) starting in 1980. The effect is reduced consumption over the period 1980 to 1990. Excess capacity persists farther into the future (solid line). A drag on economic growth (dashed line) short of an actual recession, has two effects: to postpone the date of the next price increase, and to depress consumption, which preserves excess capacity even more.

The Role of Anticipations.

But not only would it pay everyone to avoid a crisis by starting to raise prices years earlier; it would be hard to prevent the anticipation and smoothing-off of the price increase. If one expects a doubling of the

FIGURE 4



Assumptions:

- Price rising beginning 1979, TO $24 BY 1990
- Healthy growth ——, and growth slowed to 75% of base levels —•—
- Constant drilling rate

price in the near future, then in countries that experience rising marginal cost of oil supply there is an incentive to hold back production. The closer the date of the price increase, and the greater its expected size, the greater the incentive to retard output.

The fact that the market has not behaved this way as yet, that more is being offered than consumers want at even today's prices, is evidence that the producers do not expect to be bailed out soon by scarcity. True, Lord Balogh of British National Oil Co. has said of one of his colleagues: "Yamani understands that he only loses money by selling oil now, because there will be a shortage by 1985 or 1990."[1] But if either of these gentlemen held that opinion, they would stop selling oil at a loss, and the reduced production would force the price up today. Doubtless they believe in the coming shortage; their actions show they think it too far away to influence selling and investment policy today.

Thus, if the future price is expected to be much higher because future capacity will fall short of supply, price will start rising years earlier. Consumers will have strong incentives to increase stocks, and even to build larger stock-holding capacity to cushion the adjustment. Buyers will seek long-term contracts, and willingly pay more than the current market price to save something later on. Capacity is thereby shifted from the present to the future, to the profit of the producers, obviating any sudden price increase or "break."

Unlike the "gap," a price break or supply "crunch" (occurring in a period of months or a year or two) cannot be dismissed as plain nonsense. It is merely very improbable.

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[1] New York Times, March 26, 1978, p. F-9.

The Effect of More Optimistic Supply Assumptions.

Figures 5 and 6 are the same as 2 and 4, except that they assume drilling rises everywhere at the rate of 5 percent per year, which is less than has actually occurred. Ultimate reserves which can be found and developed in each country are assumed unchanged, and so is the diminishing return to added drilling effort; but that effort comes sooner. This assumption of increased drilling is more likely than the constant effort in Figures 2, 3 and 4. In most though by no means all non-OPEC countries, the higher prices are an added stimulus to import savings on real and balance of payment account. In some OPEC countries, additional drilling will be necessary to stave off declining reserves and keep production at current levels.

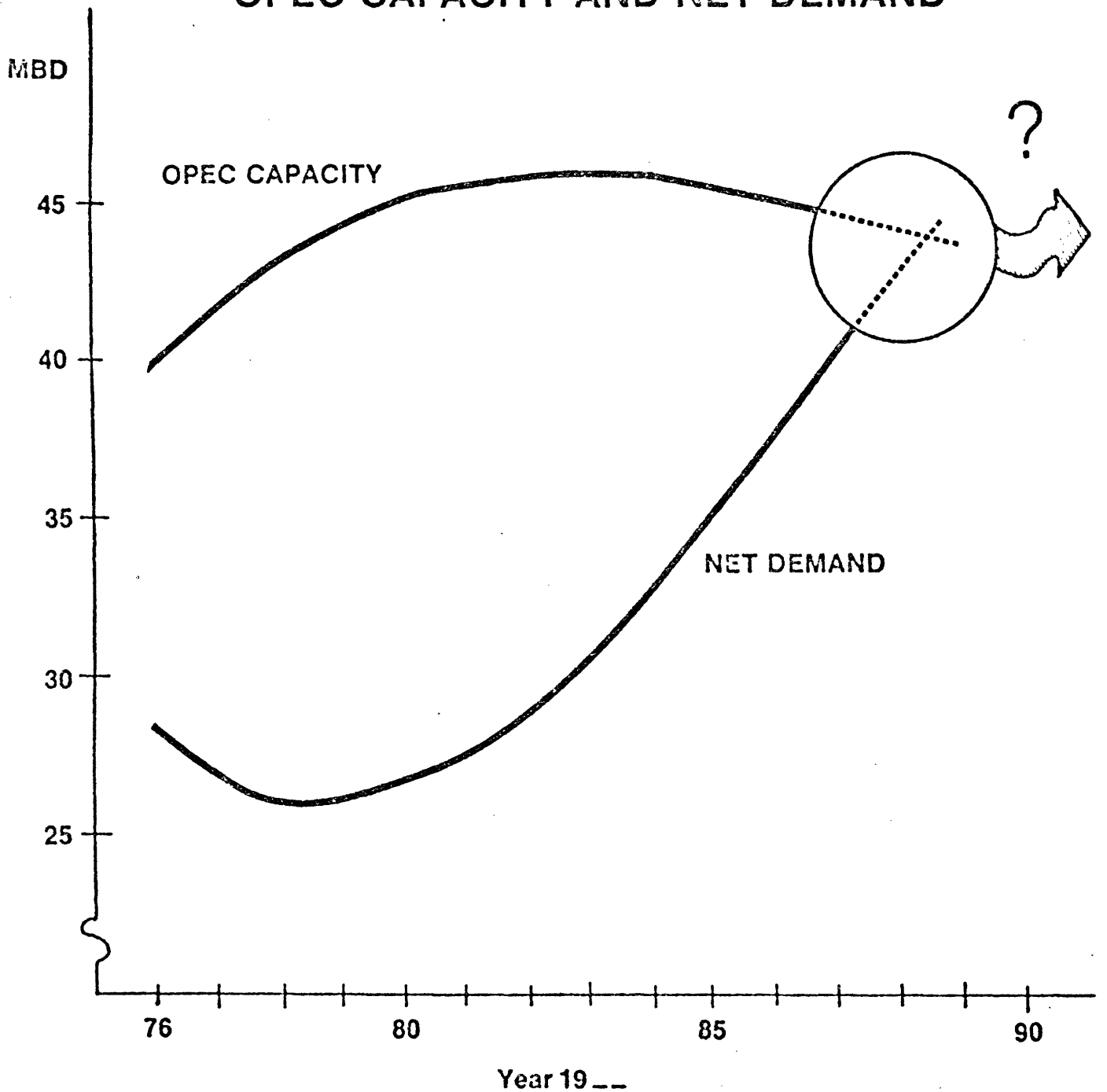
What also helps make the net result of Figure 5 and 6 more plausible is the highly conservative assumption of no new technology, either in oil finding and development, or in energy usage. Even a mild influence from new technology would have substantial effects on the residual quantity, OPEC capacity less net demand on OPEC.

3. Getting The Most From The Oil

So far, we have exorcised two ghosts--the gap and the sudden price jump--by the time-honored method of turning on the light. We should now look at companion reasons for expecting a price increase. Among the studies mentioned at the outset, the urge to project into the future parallels a reluctance to look at the recent past. During 1970-73, there were occasional spot shortages and spot surpluses. Yet the Saudi revenue per barrel of Arab Light crude went from 88 cents to $3 per barrel. The "embargo" put it to $7 on January 1, 1974, an amount justified as right,

FIGURE 5

OPEC CAPACITY AND NET DEMAND

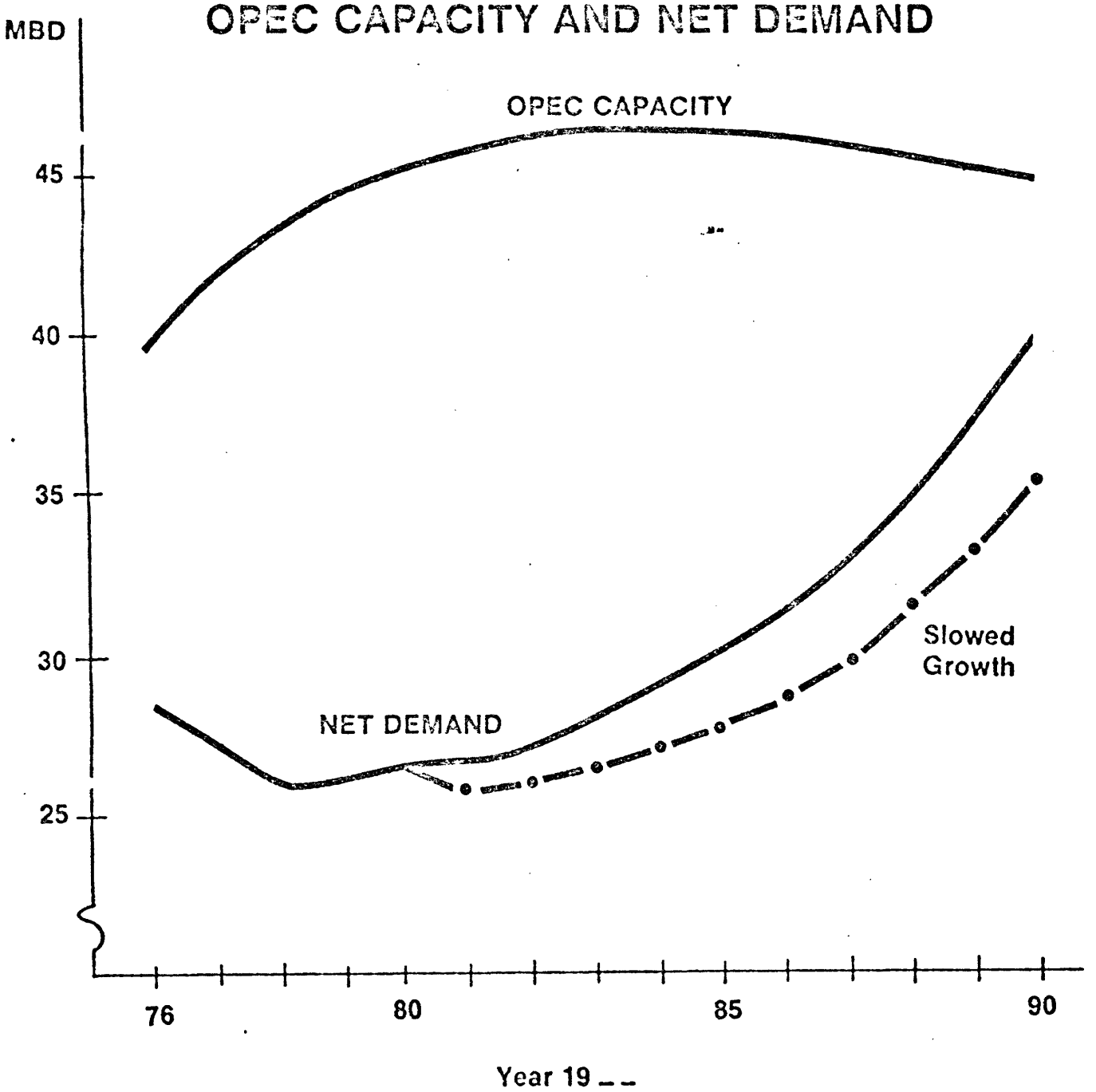


Assumptions:

- Constant real price at $12.50 (1977 prices)
- Healthy growth
- Drilling rising at 5% per year

FIGURE 6

OPEC CAPACITY AND NET DEMAND



Assumptions:

- Price rising beginning 1979, to $24 by 1990
- Healthy growth ——, and growth slowed to 75% of base levels — • —
- Drilling rising at 5% per year.

fair, reasonable, etc.[1] During 1974, an unprecedented surplus did not prevent the take from rising to over $10; by mid-1977, it had risen to $12.50. Non-gaps and even massive surpluses did not prevent a fourteen-fold increase; in real terms, by a factor of ten. Non-gaps from here to the year 2000 will not keep the price from rising either.

But if little attention is paid to the cartel, much is paid to the producing nations. Indeed there is a near-desperate concern with how to induce them to produce "enough for our needs," with fulsome acknowledgement that of course they do not need our money as much as we need their oil. How much these nations "need" has some relation, we suspect, with how much they think they can get--which brings us to the real world of the market structure.

If the oil exporting nations formed "a more perfect union," and could act the complete monopolist, they would charge a succession of prices that would generate such a flow of sales and revenues as to maximize the present value of their oil and gas holdings at any given moment. Quite a task, probably beyond anybody's powers even to conceive, let alone carry out. But looking ahead 10 to 15 years, there appears to be a consensus (which may be wrong, but which we share) that if the price of crude oil were higher than it is now, it would return a larger total revenue. Although the higher price would reduce energy demand and encourage the supply of non-oil energy and of non-cartel oil, these responses would be too small and too slow to outweigh the effect of the higher price. Hence the net demand for cartel oil, so far as we can tell, is still inelastic in the range from the current price to 1 1/2 to 2 times higher, provided the rise is not so rapid as to precipitate a major economic downturn.

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[1] Petroleum Intelligence Weekly, December 31, 1973, reprints the text of the communique.

Two pieces of evidence from our own work tend to support this consensus. First we may look at the calculations shown above, taking the more optimistic supply case (5% rise in drilling) as an example. For the years up to 1988 (when demand exceeds capacity at constant prices, and the scenario loses its meaning) the OPEC revenues are higher with rising prices, and accompanying slowed growth (the dashed line in Figure 6), than with the constant-price case of Figure 5. Even Saudi Arabia is better off in the rising-price case under our assumption about the sharing of excess capacity in the cartel. A compatible result is attained by our colleague Robert Pindyck with a quite different model also developed as part of the M.I.T. World Oil Project [3]. He starts with simplified demand and supply functions and calculates the optimal price path for OPEC acting as a monopolist and maximizing the present value of its oil resources. This calculation also shows the monopoly price rising steadily over the period to 1990 and beyond. The Pindyck results show prices rising at a rate slower than that shown in Figures 4 and 6. However, when supply functions closer to the ones used here are inserted in his analysis, it is expected that the optimal price path will be consistent with the assumptions made here.

If this consensus regarding the economic interest of the cartel is right, then we need no doomsday scenarios to tell us there must be a strong push in the direction of higher prices. However, since mid-1974, oil price increases have only slightly exceeded the increases in non-oil prices, which we define, for lack of a better standard, as manufactured-goods export prices.[1] Until vigorous growth resumes in the OECD countries, it would be unwise for

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[1] Both expressed in U.S. dollars. See Morgan Guaranty Trust Co., World Financial Markets, November 1977.

the cartel to take any moves that retard the recovery or provoke consuming-country governments into counteraction. This is the tightest constraint today on raising prices forthwith toward what traffic would bear, were the traffic in isolation.

But in fact the oil producers are far from united. Some OPEC members, like Algeria and Indonesia, are a competitive fringe who, like non-members, produce to the limit of capacity. At the other extreme, the countries of the Southern Persian Gulf, plus Venezuela and Libya, appear to consider themselves as a brotherhood, willing to curtail output severely. Others, especially Iran and Iraq, curtail with this "core" but plainly want more output.

One of the great strengths of the cartel is also its problem: the strategic position of Saudi Arabia. The question which so obsesses our statesmen, whether Saudi Arabia "will produce enough oil for our needs" is solemn nonsense. There is no such thing as "needs." The Saudis will produce the quantity which will support a price which will increase their net wealth as fast as possible within acceptable bounds on political risks. They have never done anything else, and there is no reason why they should.

But while the objective of maximum revenues is simple, the road to it is not. The Saudis are not yet, and have no wish to become, the restrictor of last resort, and to let everyone else produce flat-out while they supply only the residual demanded at the fixed price. Since 1973, OPEC output has been static, while Saudi output has grown, despite excess capacity elsewhere.

If Saudi Arabia were to become the restrictor of last resort, then their interests would diverge radically from those of the cartel as a whole. If they alone reduced output to match reduced demand resulting from a higher price, then they would bear the burden while others got the benefit. They would oppose any price increase.

Some kind of accommodation is necessary to have the others restrain their output and let Saudi Arabia keep a sufficient share of the market to let them benefit from a price increase. The Saudis did just that in 1977, delaying their price increase and gaining market share; by the end of the year, the problem was back again.

There will be many more such incidents. Market sharing is a touchy business, for the OPEC governments must solve three problems simultaneously: (1) company margins, (2) the price differentials among crude oils, reflecting differences in their values as finished products and (3) the market shares of the governments. For the operating companies, a difference between what they pay for any two crude oils must be matched by the difference in what they receive for those two oils, either when resold or when refined. Otherwise the company's margin on one crude is greater than on the other, and there is an incentive to shift from lower to higher margin crude oils. But since the relative values of crude are constantly changing in response to consumer market changes, there are constantly changing discrepancies between the respective market values of crude oil and their official prices. The differentials are large in relation to company producing or refining margins. A small net advantage can move a company from one source of crude oil to another. The OPEC countries have shown themselves quite sensitive, with surprisingly low thresholds of anger, to differentials which are a negligible percentage of the price of crude.

Hence the great flap in the first half of 1977 over the so-called "two tier price system" was the latest but not the last squabble over differentials which influence market share. There is no general solution, although much computer time has been spent in search of one. There will be one ad hoc accommodation after another.

4. The Real Problems of the 1980s

To summarize: if the various "gap" scenarios are to be taken seriously, their real message is that the oil price is going to increase significantly over the next decade. But the price is going to rise, scarcity or not, because the monopoly has not exhausted its price-raising power. If they can keep their act together, the glut may continue for many a year, but the price will keep rising.

The important question is timing, and the speed with which prices will rise. For planning purposes, the cartel managers are no better informed than we. They do not know what their price policies will do to the world system; their estimates of oil demand, and supply from outside the cartel (of which more below), must show just as big a variance as the studies in Table 1. At constant prices an imbalance would probably arrive, but they cannot predict it closer than plus-or-minus five years. They cannot forecast the behavior of consumer countries any better than we. Therefore, they must move in the face of considerable uncertainty, minimizing the really dangerous risks and transferring wealth to themselves as best they can.

But the cartel has one great advantage. They make the decisions and can adjust plans as conditions evolve. Rising prices will likely cause any calculated gap to move into the future--like the proverbial horizon that recedes as you approach it. If a demand-capacity crunch appears imminent there is a safety net: the dominant OPEC producers, especially Saudi Arabia, will temporarily produce more, and even keep the price below their wealth-maximizing point, for as long as necessary to avoid an international economic-political crisis which could cost them dear. If they overshoot, there is room for adjustment. In such a circumstance, the expected pattern will be cautious moves--testing the waters. There will be no firm plan to increase

by X% per year for ten years. But there is likely to be a continual pushing on the price front, beginning soon.

We do not argue that the higher prices we forecast are "needed" in some absolute sense, apart from the peculiar structure of this market. Were the international oil market competitive, the current price would not exist now and probably would not be reached in the 1980s. There is an invincibly vague consensus that (1) "the market will take over in the 1980s and make the cartel obsolete," and (2) that "the long-run competitive price will be even higher than the current price." The second proposition may be true, though as yet unproved. The first is simply wrong: in any circumstance, a cartelized price tends to be higher than competitive. The cartel is never obsolete, because there is always a profit in monopolizing a market.

All we have attempted is to draw out the implications of the current monopoly, and to discern what the cartel core can and will do in its own interests: raise the price gradually and cautiously. This will be better for all concerned, buyers and sellers; but the costs and dangers only diminish, they do not disappear in the trajectories of Figures 4 and 6. There will be great pressure on world financial markets. These markets responded well to the difficulties of the 1974-77 period, but one obvious reason for the good performance was the decline of the OPEC surplus from $63 billion to $35 billion.[1] A doubling of world prices would not double OPEC revenues, but the OPEC surplus could go far over the 1974 figure, and it would persist longer, for imports by OPEC countries could not be expected to grow as rapidly as in 1974-77. More important are growth effects. We do not believe that a steady rise in oil prices, as illustrated in Figures 4 and 6,

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[1] Morgan Guaranty Trust Co., World Financial Markets, various issues.

would have a strong direct effect on economic growth. But the policy responses of importer governments as they attempted to control balance of payment and inflation effects could be very serious, particularly as the protectionist beggar-my-neighbor tide creeps upward. It is unhappily reminiscent of the Great Depression of the 1930s which, economists now agree, resulted from no unavoidable maladjustments, but rather from a recession aggravated by bad monetary and trade policies to a self-cumulating disaster. The less developed countries would be the most seriously hurt.

In the United States, the strife over energy policy will be exacerbated by rising world oil prices. The public revulsion from "windfall gains" to oil and gas producers has required price controls on oil and gas and the entitlements system on oil imports, which continue to do economic damage. If world prices rise strongly, a domestic storm is likely over any attempt to recognize the facts of life in world oil.

One policy open to consuming countries has not yet been seriously considered: tariffs on imported crude oil and corresponding excise taxes on products. Their effect is best understood by supposing that consumer prices were now at their maximum, because demand for OPEC oil had turned at least slightly elastic, so that higher prices would mean less total spending on oil products. The tariff would then be at the expense of OPEC. Either the oil exporters would cut their prices, or they would accept lower revenues. The shoe would be completely on the other foot: consuming countries could keep raising tariffs, forcing down the price as far as they thought prudent, i.e., to where it threatened supply. To be effective, the tariff would not be a specific duty in dollars per barrel or gallon, which could be passed on in the final price, but would be proportional to the crude oil price. Crude oil exporters would be on notice that a lower crude oil price would mean a lower tax.

But even short of the maximum profitable oil price, consumer governments may try to curb their import bills by levying the tariffs or taxes on oil products, rather than by deflating their economies and their imports generally. The switch from shotgun to rifle tactics would have the same effect as a much greater price elasticity for oil. A monopolist who reckoned, for example, that every one percent price increase would lower sales by one-half percent would have an inducement to raise prices, as he does today. But if he knew that consumer governments would levy additional taxes just slightly higher than the additional prices, the loss of sales would be more than twice what it would be in the untaxed market, and the price increase would not pay.

Tariffs and higher excise taxes would thus raise large revenues and also reduce oil import bills, and the foreign exchange drain. OPEC revenues could be largely diverted to the governments closest to the consumer. Although the OPEC nations have long sensed this power, and complained of it, there is no indication that any importing governments are officially aware of it. The cartel managers would be well advised at least to keep this power in mind, and moderate the rate of price increases. Otherwise, consumer governments might drift inadvertently into a tariff and/or tax policy which they would never choose deliberately.

5. Conclusion

The oil problem is not a one-and-for-all "availability" crisis. In the absence of war in the Middle East, we will never see a "gap" (and "gap" studies do not deal with war in any event). What the world faces is one or several decades of grinding difficulty in holding the monetary system

together and avoiding recession and collapse of world trade as a result of attempts by oil importing nations to curb their oil deficits by deflating their economies and protecting jobs by import controls. The pressure will be relentless, and if trade and growth policies of the major OECD countries fail the test, then there will be lower growth rates and possible stagnation or even depression.

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