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THE LIFE CYCLE OF A PETROLEUM ECONOMY

**SEERS
COLLECTION**

The class of economies that depends on oil exports is of great professional interest to the economist, because its development takes an analysable and (in principle) predictable form, and also is inherently dramatic - involving, in fact, hubris, the essence of classical drama.

The historic challenge to an oil producer can be put quite simply - to create a viable socio-economic structure before oil revenue declines. It is, ^{also} ~~moreover~~, given the means to do this. The gap between the retail price of oil and the cost of production is so large that although governments of consumer countries tax away much of this 'rent'; and enormous profits are made by companies that extract, refine and market the oil; much is still left for the producing countries. Moreover, the great majority of these financial resources are directly at the disposal of the government itself, and the development of an oil economy is therefore much more subject to the influence of government policy than is the development of any other type of economy. Yet all governments of oil-producing countries find great difficulty in creating a viable socio-economic structure in time. I shall discuss the roots of these difficulties here, and the limitations of conventional economics in analysing the problems of an economy of this type.

Trends in the world price

There are exporters' associations for a number of minerals, but OPEC has been uniquely successful in raising export prices far above marginal costs, especially costs in the Middle East. It has been able to do this essentially because the demand for oil is especially inelastic.

The reasons for this inelasticity are:-

- (a) Oil provides inputs into many of the goods and services that an advanced civilisation could not easily do without

* I am grateful to Paul Bennell of IDS for comments.

(making possible human mobility and temperature control, as well as supplying the feedstock for fertilisers, plastics and many other chemical products);

(b) For many of these uses (especially motoring and aviation), substitutes would be expensive and inconvenient.

The world demand and short-term supply curves for oil look very roughly like this:

(Diagram I here)

The price would be in short-term equilibrium at B *if* there were perfect competition. But the total income of producers (governments and companies) can be maximised at a price of about A. This is what the price might be if there were a worldwide production monopoly (though the encouragement that a high price gives to oil exploration and to research on non-traditional forms of energy - and perhaps the possibility of a political reaction - might make the monopolist settle for something rather lower). Exactly where the world price lies between these limits - say between \$2 a barrel and \$20 - is not determined by economic factors (though these do ^{influence} ~~set~~ the shape of the curves and the positions of the limits), but by the bargaining strengths of companies and producing and consuming governments. What helps the producing governments is that oil reserves are relatively concentrated geographically, only about a dozen countries accounting for the great bulk of world trade, and within that dozen a handful (including the biggest) belonging to one political region.

Economic theory as such - i.e. if abstracted from political factors - is therefore of limited help in explaining a main determinant of the economic growth of oil-producing countries, the price of its leading export.

(Diagram II here)

After stability for some decades (even a decline at the end of the 1950s ⁽²⁾), the dollar price of oil doubled between 1970 and 1973

(2) The terms of trade of Iran deteriorated more than 40 per cent between 1956 and 1962 ("Iran's Terms of Trade", Ministry of Finance, 1966). Other producers had similar experiences and this stimulated the creation of OPEC in 1960.

1/ In the case of oil, demand is independent of the price. Because of its basic nature, a rise in its price affects world economic output.
(Mandates) *(2)*

and trebled in 1974, because of the favourable political conjuncture for producers. It has, however, only risen slowly recently, more slowly than the dollar prices of manufactures, in part because of the recession, in part because some governments do not find it convenient to exercise their full bargaining power. So its purchasing power (or 'real price') has slipped back a little. It may not resume its rise for a few years now, because of the coincidence of the slow economic recovery in the main oil-consuming countries with the growing flow of non-OPEC oil from Alaska and the North Sea, soon to be followed by the new Mexican fields.

But during the 1980s, the whole supply curve could start to move upwards (in real terms), as some of the most accessible reserves begin to be exhausted. The oil surplus of the COMECON group, now apparently declining, may well have disappeared, even turned into a deficit. Better conditions will have been created for a renewed rise in the real price, especially if governments in the industrial countries find unemployment politically threatening and stimulate economic growth. There will be increasing pressure from those oil exporters facing foreign exchange difficulties because output has levelled off or is falling (see below), or because oil capacity is limited in relation to their population. (Many of these ^{have} already ^{experiencing difficulty in their foreign payments} ~~face renewed foreign exchange difficulties~~).

The timing, speed and extent of this future upsurge in prices depends mainly on the cohesion of OPEC, but it could be quite sharp ^{unless} ~~if~~ in the meantime nuclear power and other new sources of energy have ~~not~~ been developed on a big scale in the leading industrial countries or their energy consumption curtailed. (It could also of course be triggered off by another war in the Middle East, or internal difficulties in any major producer.)

Trends in a government's share

The second determinant of a government's resources, and therefore of national economic growth, is the proportion of the export value

it takes⁽¹⁾, whether in royalties, rents, taxes or profits of its oil corporations. Here again the forces at work are fundamentally political, and therefore not easily handled with the tools of conventional economic analysis.

This proportion moves along a path approximately as in Diagram III.
(Diagram III here)

The government share is typically low at first. Being inexperienced, it is ignorant of its strength (even perhaps of the extent of its mineral resources) and is satisfied with any arrangement that makes a significant addition to revenues. It does not consider how much it can squeeze out of foreign companies, still less whether it could extract the oil itself. The administration of taxes, which it relies on as the main instrument, is carried out without much expertise on what items and what prices are legitimate costs of production. Moreover, generous depreciation (and even depletion) allowances often permit the companies early recovery of exploration and development expenses.

But there is a learning process. Tax rates rise in due course, perhaps stimulated by the example of other countries; tax administration is tightened; and national oil companies are established (such as PETROVEN in Venezuela, SONATREC in Algeria, BNOB in Britain). These at first get preference in licensing (or sole exploration rights), then take over production, as ~~the~~ technological capacity grows. Different oil producers are at different points on this curve, depending on the time they have been in production and their political and technical capacity.

(1) Strictly the contribution to national income includes also costs of production incurred in the country (e.g. local salaries and wages, purchases of materials locally produced and local costs of refining). These are, however, usually of rather minor importance, because employment in oil is low and oil extraction runs well ahead of local capacity in oil-related industries. (Even in Britain, despite the activities of the Offshore Supplies Office, only about two-thirds of the inputs of oil development have been bought locally - less in the early years. See annual reports of the Offshore Supplies Office, Seriatim).

Trends in national output

Any national pool of oil is of course finite. It is true that a country's effective reserves depend on techniques of extraction and conservation, and on the price of oil, but the physical limits are still there. So the course of a country's oil production, from the viewpoint of an historian of the future, takes the general shape of Diagram IV (the actual curve in a given country being determined by the timing of exploration and by depletion policy). After a slow gestation period, the youthful phase begins with output rising sharply. Then the oil economy enters a phase of maturity, with output running at a plateau for some years, perhaps sustained by new discoveries. Finally senility starts to set in: output declines and dwindles to virtually nothing. The volume of recoverable oil is the area under the curve. This limits the possible depletion paths: extraction can be prolonged by avoiding a high peak, but it must peter out in what is by historical standards a very short time. The whole brief incident looks like being virtually all over in less than a century in all of today's producers (except perhaps Saudi Arabia).

(Diagram IV here)

Different countries are at different phases of the production cycle. Iran is in its phase of maturity, unlikely to exceed by much its recent levels of $6\frac{1}{2}$ million barrels a day. Venezuela, Bahrein and Kuwait (like Romania) have already passed their peak output⁽¹⁾, which they are unlikely to reach again (though in Venezuela - by contrast to the others - there are still possibilities of major finds). They are on the right hand side of Diagram IV, passing through their 'middle age'. For these countries in particular, the price rises in 1973-74 (and increases in the government share in the price) were very important, because they enabled revenues to continue climbing even though output had levelled off or fallen⁽²⁾. They provided a sort of rejuvenation.

(1) The Venezuelan output in 1970 was more than 3.7 million barrels a day compared to 2.4 in 1976.

(2) They were also very important for countries like Indonesia with relatively large populations in relation to oil output and therefore not easily covering import needs.

An economist would say that the optimal rate of depletion of the stock of oil, from a long-term national point of view, should depend principally on expectations about world price, and on time-discount rates which allow for the short-term need for foreign exchange, reflecting in turn the feasible pace of investment.

But there are strong non-economic pressures on governments to produce at rates much higher than economically optimal, indeed not to have a depletion policy at all. The euphoria as revenue rises is such that it is difficult to resist claims for higher salaries and wages, especially those made by employees of the government itself. These spread to other sectors (though only to some parts of agriculture), and fast increases in demand for consumer goods are induced. In consequence, a large proportion of the imports of oil exporters (more than two-thirds in the case of Iran and Venezuela) does not consist of capital goods at all, or even of consumer necessities, and governments find they need exports not to finance development projects but to cover consumer luxuries⁽¹⁾.

Moreover, many oil producers export much more than they need to finance the flood of imports. They are pressed to do so by oil companies, anxious to recover exploration and development costs, and by foreign governments, on behalf of their oil consumers. Overseas financial assets are therefore accumulated - first cash reserves (over and above what are necessary), then a miscellaneous collection of foreign government bonds, equity shares, real estate, etc. The yields on these may not match the long-run rise in the value of oil kept in the ground, yet overseas investments could, it is true, reinforce the bargaining position of an oil producer (even more of oil producers collectively), if participation were judiciously bought in the producing companies,

(1) A scathing attack on "the physical and moral degradation of the public" in Venezuela due to increases in pay after the 1973-4 price rise was made in 1976 by none other than Sr. Perez Alfonso, the "Father of OPEC" (Resumen 25.1.76). He also described the plan for national development as a "plan for national destruction".

or 'downstream' and marketing facilities purchased, or investments made in alternative sources of energy - as presumably our hypothetical world oil monopoly would do⁽¹⁾.

Conservation policy may also be neglected.

In the phase of youthful euphoria, there is little attempt to monitor production - for example, companies may be allowed to locate their wells in patterns that reflect short-term profitability rather than long-term national needs, or to flare associated gas indiscriminately. However, supervision gradually improves as experience is gained and personnel trained.

Trends in revenues

The time pattern of revenues for any particular country is determined by the conjunction of the factors mentioned above - i.e. by superimposing the general trend in the world price (Diagram II) and in the particular government's take (Diagram III) on the particular path of national depletion (Diagram IV). The effect of trends in prices and taxes in the 1970s has been to prolong the period when revenue is at its peak or to mitigate its decline. But eventually the curve in Diagram IV takes charge - there is a limit (of 100 per cent) to the proportion the government can take and anyway as output declines, this proportion and the price become increasingly irrelevant.

The use of revenues

The size of revenues from oil means that governments which export it can invest heavily without suffering the typical foreign exchange crises and inflationary pressures of 'under-developed' countries which attempt to force the pace of economic

(1) It could alternatively be used to build a viable and integrated regional economy by aid to neighbouring states. The coming rise in oil prices will create great economic problems for countries which lack both oil and the capital to develop alternative sources of energy or additional export industries.

growth. Growth rates of 6 to 8 per cent are typical for some decades, especially where oil reserves are large in relation to population. But ~~these are~~ ^{the rate of growth is} not very relevant - indeed income is carried to heights which may not be sustained. The test is whether they can diversify their production and their exports. There is no economic reason why they should not do this - and abolish poverty and unemployment, enabling them to create genuine democracies, socially integrated and politically as stable as Sweden or Switzerland, strong enough to survive the exhaustion of oil. Indeed diversification is usually the official long-term strategy, summed up in the Venezuelan adage sembrar el petroleo:"Let us sow the petroleum".

It is clear, however, that the traditional oil exporters are not achieving this metamorphosis. In Iran, oil still accounted for 89 per cent of exports in 1970, and in Venezuela 91 per cent, despite the decline in the real price in the previous 15 years ⁽¹⁾. (These ratios are of course still higher now.) In both countries, oil still provided in 1970 more than 50 per cent of revenue. In both of them, manufacturing had remained fairly constant as a proportion of national income, and agriculture had sharply declined, the big expansion being in services. (Typically, the bureaucracy of a petroleum economy is swollen far beyond that of its neighbours.)

Indeed, some oil exporters seem already to have lost their historic opportunity. (I cannot speak about Britain or Nigeria, partly because they are, especially Britain, still too young for the pattern of their life cycles to be clear.) This is not hard to explain. It is difficult in oil exporting countries for either industry or agriculture to produce import substitutes (still harder, to produce exports) at prices anywhere near world market levels.

(1) Nezhat Sedaghat "Development Policies of Iran and Venezuela (1950 to the early 1970s), a comparison of the industrialisation and diversification attempts" (M.Phil. dissertation, Sussex, 1977).

Diversification is hampered by:

- (i) An overvalued exchange rate, due to the chronic export surplus;
- (ii) High salaries and wages, stimulated by the example of the government and the oil corporations (public or private).

So local industries need heavy protection, demonstrating their inability to compete in world markets (and therefore their limited contribution to the long-term strategic needs).


But again, parts of the explanation are non-economic. Savings accumulate in the hands of the government, which is organised and accustomed to administer public works and housing projects (e.g. the expressways and 'superbloques' of Venezuela), not to establish new industries.

Perhaps the main reason why the declared socio-economic objectives of oil-producing governments are not met, however, lies in what oil does to the perceptions of the decisionmakers themselves. It seems to offer a complete solution to economic problems. Those with political power tend to forget that oil revenues will inevitably decline in due course, and aim simply to achieve temporary prosperity. As pointed out above, when oil revenues soar (especially in periods when prices, government take and output are all rising simultaneously), euphoria sweeps through an oil-producing country, leading to a dissipation of export earnings in personal consumption. Moreover, checks on government expenditure become less strict. Big glamorous projects are readily adopted. A great deal is spent on military equipment, especially the latest aeroplanes, which are easier to justify in terms of technophilia than of strict military necessity.

Indeed, one characteristic of oil-exporting economies is that the hotels in their capitals are full of businessmen in search of contracts or licences to invest - even more so than in other dependent countries. Because of the many pressures on the

government to spend the mounting revenues, there is not time to base industrial policy on a phased programme of industrialisation, keeping pace with technological research capacity, still less on a careful assessment of what techniques of industrial production various countries have to offer at what prices (the traditional Japanese procedure). So policy consists of a series of ad hoc reactions to the proposals put by whichever businessmen happen to be in the country. These proposals may have little relation to long-term economic and social needs. They may, for example, lead to factories being sited in or near the main cities, increasing the economic and social gap between town and country and stimulating internal migration until it becomes socially damaging (and economically costly). Contracts are so profitable that extra-official recompense can become endemic, affecting the allocation of resources.


Development projects may provide little actual employment. The combination, referred to above, of relatively high wages, an overvalued exchange rate, together with a shortage of skilled workers and supervisors, and possible 'incentives' such as accelerated amortisation and cheap credit, may, allowing for the typical urge to spend revenues somehow, encourage the use of capital-intensive techniques of both construction and operation. Moreover, employment in the oil industry itself is negligible, from its very nature, and actually declines (with the slowing up of ^{oil} development) long before output itself starts to fall. In many countries, especially the smaller ones, the jobs that are created go mainly to foreigners - the higher level ones, because of shortage of skills, unskilled jobs because of the reluctance of the local population to do manual labour ⁽¹⁾.

So while this upsurge of public and private spending creates a fast rate of economic growth, it is unlikely to yield sufficient increases in employment to match the rising labour force, especially that of the urban areas (augmented by migration from the countryside). Thus in Trinidad, 

(1) See "Migration and the Labour Force in the Oil Producing States of the Middle East", by Fred Halliday, Development and Change, Vol. 8, No. 3, July 1977.

the one petroleum economy with good, regular and frequent labour force surveys, open unemployment has risen to more than 10 per cent (despite an economic growth rate of over 5 per cent for three decades). Open unemployment excludes, of course, those who do not look for work because they have little hope or inclination - and all those in makework jobs, whether in the government or the private sector.

Moreover, because there appears in the short term to be no foreign exchange problem and therefore no need for industrialisation criteria and because haste precludes proper planning, a productive structure is created which is highly dependent on cheap energy and imports of equipment, intermediate products and technology, and therefore will only be sustained with great difficulty when oil exports start to decline. Similarly, the life-styles of consumers become adjusted to imports of goods which cannot be produced locally (wheat, for example). Even the layout of cities - which will last for centuries - may reflect the temporary cheapness and availability of petrol⁽¹⁾.

The rural areas do benefit to some extent from the fast economic growth. They usually get injections of purchasing power, sometimes through the devolution of revenues to regional and local authorities, and cash remittances from relatives in the cities or the oilfields. Purchases of some locally-produced foods rise. But on the whole, the pattern is one of increasing concentration of income, both geographically and socially. In both Iran and 

(1) The government of a petroleum exporter usually allows petrol to be sold to local consumers at prices well below what they would have to pay elsewhere (or, from another point of view, its long-term social cost). The result is not even increased mobility. The combination of a low petrol price with uncontrolled imports (or local assembly) of cars, and fast rising personal incomes, can mean simply traffic growing on a scale that outruns local road capacity, even although this is increased rapidly. Traffic in capitals of oil exporters moves as slowly as in any city of the world.

Venezuela in 1971, the lowest 10 per cent of income receivers got only 1.2 per cent of personal income, whereas the top 10 per cent received 47 per cent and 41 per cent respectively - nearly 40 times as much. This concentration is indeed visible to the most casual observer in the form of large and growing disparities in housing, clothing, means of transport etc.

The bulk of social expenditure typically flows into urban areas and to the particular advantage of the salaried personnel and wage earners in government, petroleum and modern manufacturing - for example by the provision of hospitals, universities, urban motorways, etc. Usually only a small fraction of public revenue is devoted to social security benefits (except in tiny producers, such as Kuwait or Abu Dhabi, and even there most of the benefits are confined to citizens, who form less than half the population).

On the other hand, direct taxes, such as income tax, remain low, by international standards - in part because the size of oil revenues obscures the need for revenue from other sources.

Some countries (e.g. Algeria and Libya) have tried to limit inequality by imposing ceilings on salary levels. However, this is hard to implement, especially in the oil industry: those in senior positions are in an international market, subject to offers from international oil companies.

Finally, even inflation may not be avoided, despite the supply flexibility provided by massive imports. The unlikelihood of resistance to salary and wage demands has been mentioned. In addition, the demand for imports may outrun even their rising volume, because of limits in physical capacity, e.g. transportation.

Institutional aspects

The economic and political power offered by the revenues makes political power attractive, with whatever degree of repression seems necessary. This may delay the learning process and lengthen

the period of inappropriate deals. When, as inevitably, oil exports level off, decline and come to an end, immense strains will be imposed on the political and social structures of countries where consumption styles and production systems have been based on high oil revenues.

The impact may be cushioned by income from assets abroad (and their sale), and by rising output in whatever alternative dynamic sectors have been created. The rise in unemployment may be mitigated by the departure of migrant workers (those who stay may constitute a severe social problem in a declining economy.)

But taxes will inevitably rise sharply (especially on domestic uses of oil), large numbers of civil servants may well be dismissed and military equipment sold off. Just as the public sector is the main beneficiary of the boom, so it will bear the brunt of the slump. Then the typical euphoria of adolescence will give way to the equally typical remorse of the aged over opportunity foregone, and political tensions may mean even greater authoritarianism.

Decisionmakers in Venezuela are perhaps the most conscious of the drama that lies ahead if they are unable to create viable alternative industries in time, and they are fortunate in being endowed with good natural resources of other kinds. Their strategy is to induce a rebirth of the economy by basing steel and engineering industries on the iron ore and hydro-electric resources of Oriente province. Part of the big increase in oil revenues since 1973 has been earmarked for this purpose and put in a special fund (the fondo de inversiones). But the world markets for the products of heavy industries are highly competitive and it remains to be seen whether it will be possible to support indefinitely the numbers and consumption standards of the large Venezuelan bureaucracy and professional class by these means.

Bahrain is following a different strategy:
it is establishing a role as a centre for services (especially finance) in the Middle East. The feasibility of such a role has been increased by the political troubles in the Middle East's traditional banking centre, Lebanon. But this is a possibility open only to very few, very small producers.

Britain faces a somewhat similar problem⁽¹⁾. North Sea oil is already bringing to the government a welcome relief from the politico-economic crisis of the mid 1970s. But, if the revenues are used to increase consumption in general (e.g. by tax reliefs), rather than to finance much more difficult tasks of restructuring the economy and easing social problems, this country will also face severe withdrawal symptoms when oil revenue starts to decline, despite the range of other industries already in existence. The crisis will probably come before the end of the century if the government succumbs to the pressures and temptations to permit large net oil exports.

Oil is therefore not by any means the blessing it appears to be. It provides great opportunities, but the very nature of the industry also makes these almost impossible to grasp and induces growing structural strains. A particular property of oil is that it casts a smokescreen over a country's real problems. Symptoms such as foreign exchange problems and fiscal inadequacies are temporarily concealed.

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Economics textbooks produced in Europe or North America (or for that matter in communist countries) make little reference to the factors mentioned above. This reflects inter alia the lack of professional interest in taxonomy, the classification of economies for analytical purposes. This in turn reflects the concentration of the profession in one type of country - the industrial exporters.⁽²⁾

It also reflects an attempt to isolate economic factors from their socio-political context. Texts that fail to differentiate between types of economy - and to allow where need be for non-economic factors - are of limited use in preparing the economists of the coming generation for their main role of analysing what choices of strategy are open. This

(1) See "North Sea Oil: The Application of Development Theories" (M. Phil. Faculty and Students, IDS Communication, 121, 1977)

(2) As is implied above, one also needs to differentiate within the oil-exporting group, especially between those with large and small populations in relation to output. (The dividing line would be half a barrel per day per capita.) *For some purposes, however, one might want rather to classify by political or cultural characteristics.*

is particularly the case for oil-producing countries, where economics can make an important, though limited, contribution. Yet even in Britain, where oil has been flowing for some years, and expected for many, very few Universities offer lectures on oil economics, still fewer on the Comparative Political Economy of Oil, drawing on the experience of countries facing formally similar problems. It is possible in fact for an economics student in Britain to go through a course lasting three years without ever hearing the word 'oil' (1). Despite the powerful urge in oil exporting countries, as elsewhere, to emulate overseas syllabuses, their main need is not sophisticated macro-economic models, but models specifically designed to show inter-sectoral and national/foreign linkages, with allowance for various factors that cannot be accommodated in purely economic models. So a great responsibility lies with national professions to develop their subject in a relevant way and illuminate the actual development options open. (2) In the case of the petroleum economy, it is our responsibility to show the conditions for surviving death as a petroleum producer and achieving reincarnation as an economy of another type.

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1.2.78

(1) He may also hear little about the implications of country size or location.

(2) This may be made much easier or much more difficult by the statistics available. Many official statistical offices in oil-exporting countries pay little attention to the operations of the petroleum industry. This applies especially to the system of national accounts. The Banco Central of Venezuela has prepared for many years a framework of national accounts, with a separate account for the oil industry integrated with the others, showing how oil-generated incomes flow through the economy. This makes possible simulations of different assumptions about oil prices and production, essential steps for economists who are either planners or teachers. I believe, however, that this is the only oil-exporting country where this is done.

Kerry

Price

A

B

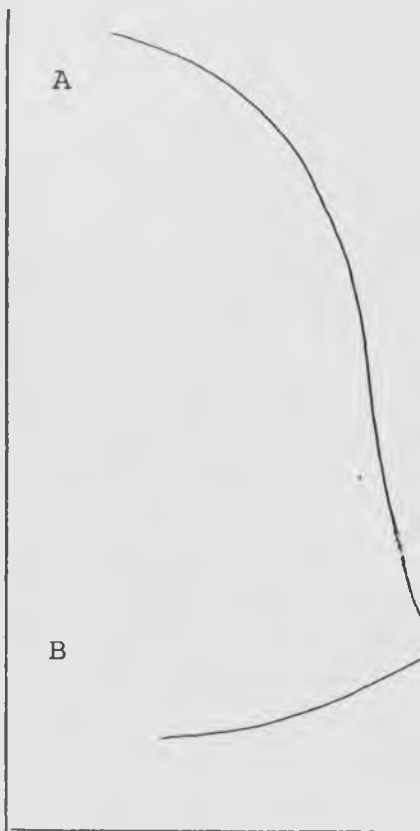


DIAGRAM I

OIL: WORLD DEMAND AND SUPPLY

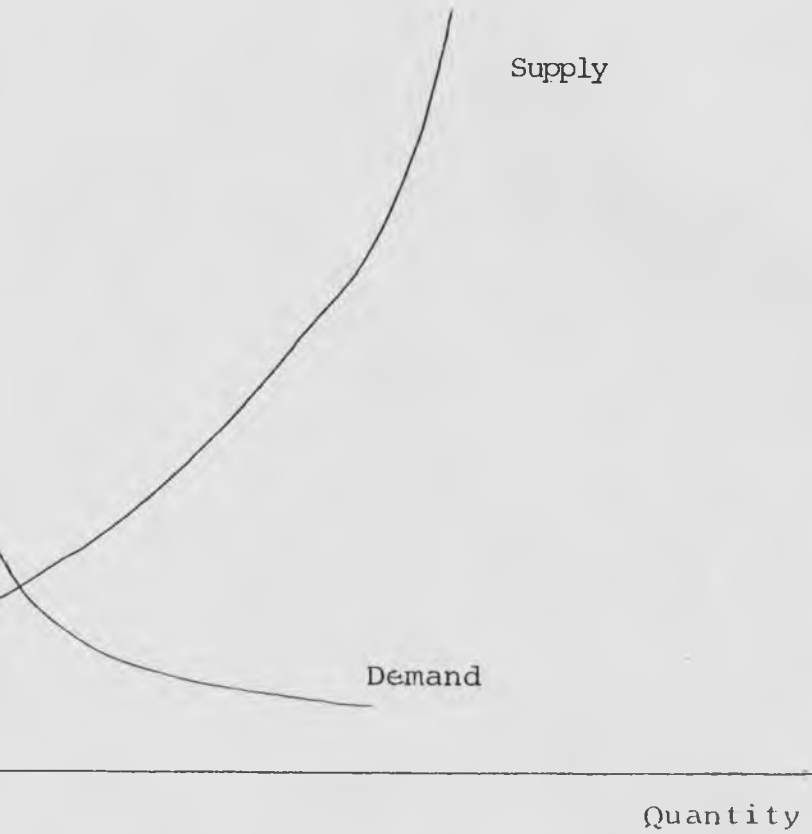


DIAGRAM II

OIL: WORLD PRICE TREND (smoothed)

Real
Price

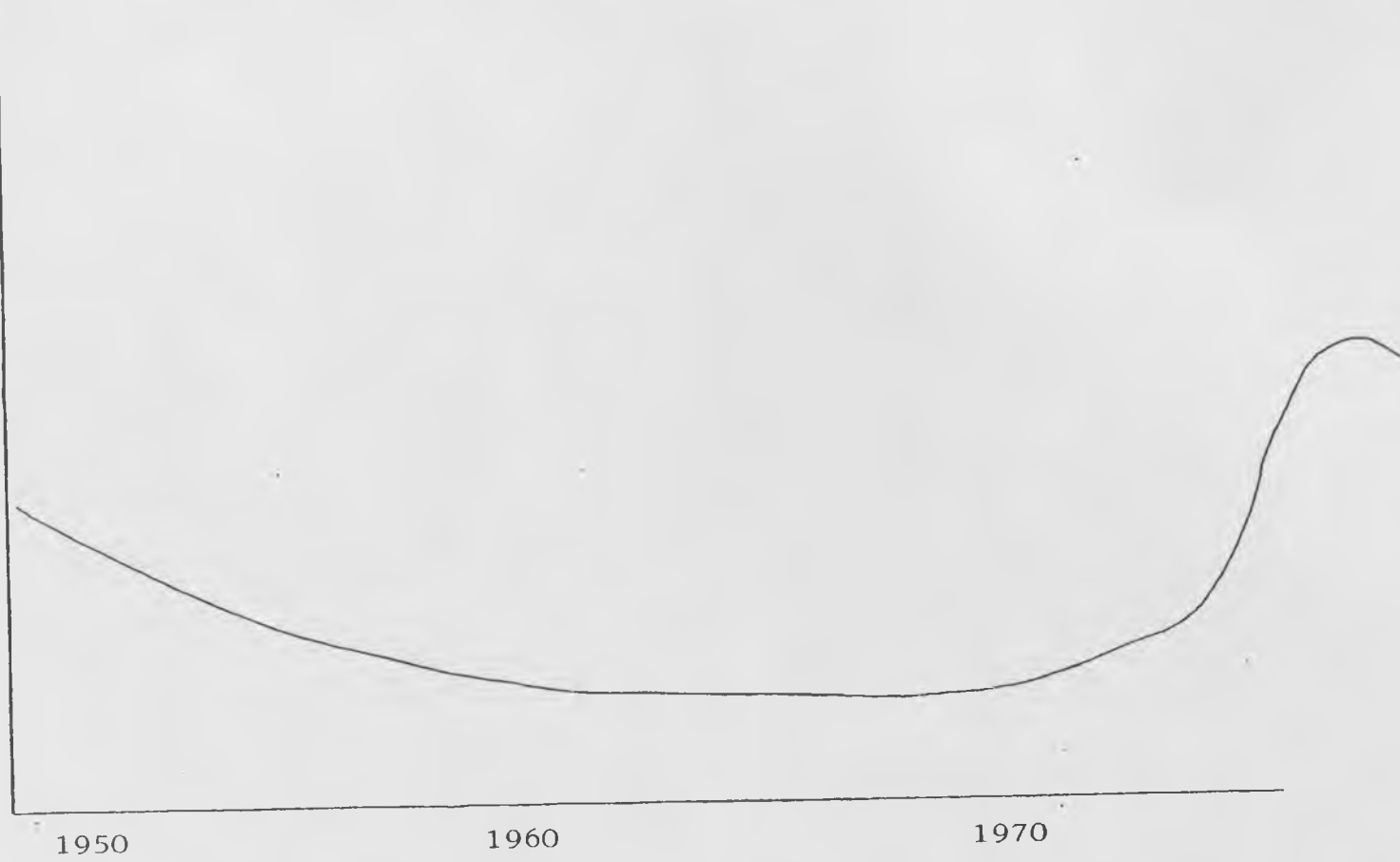


DIAGRAM III

OIL: TYPICAL PATH OF GOVERNMENT TAKE

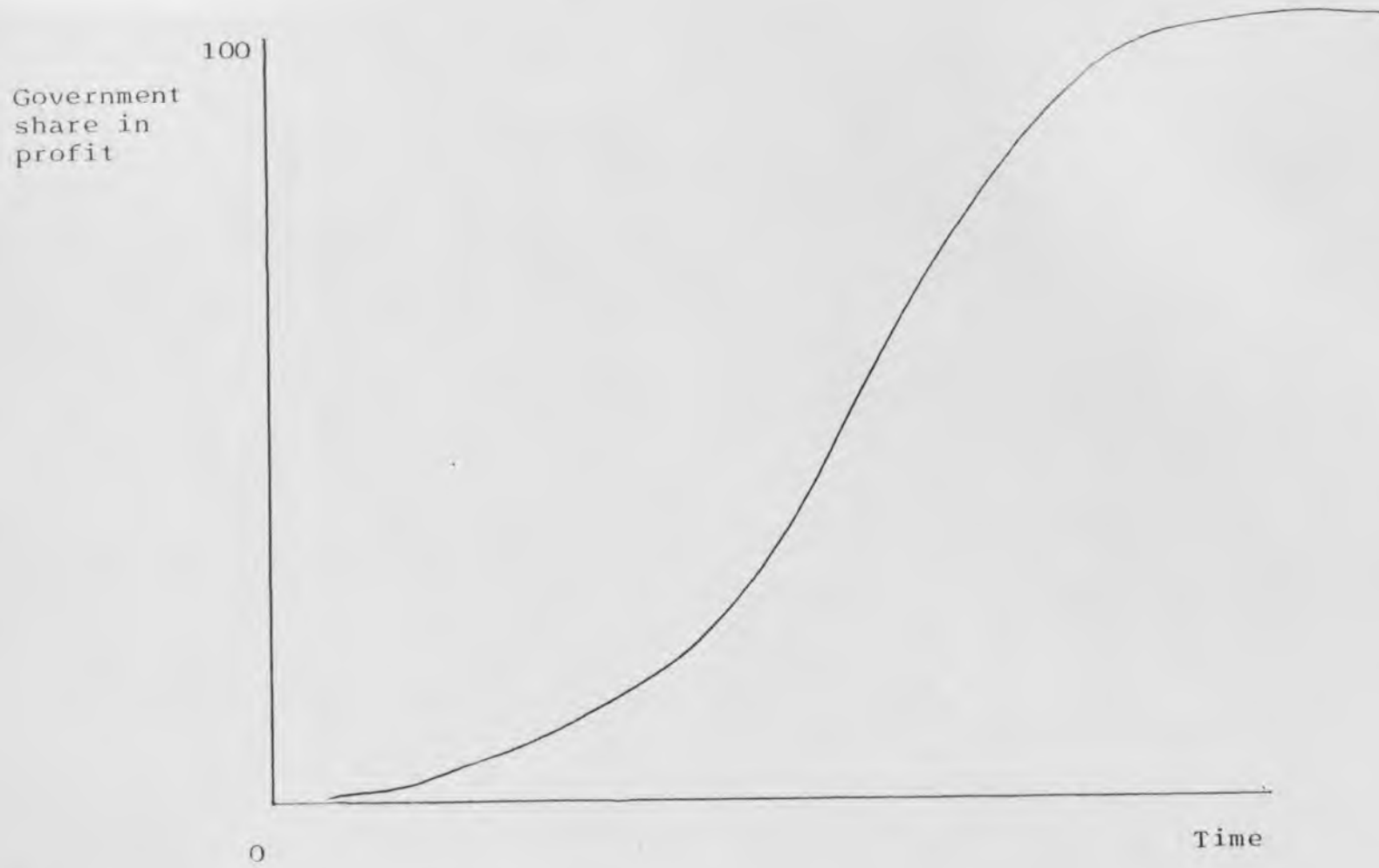


DIAGRAM IV

OIL: TYPICAL PATH OF PRODUCTION

