Essentials of Petroleum

A Key to Oil Economics

P. H. Frankel

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With a Foreword by
M. A. ADELMAN

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FOREWORD

Having read this book many years ago and profited greatly thereby, I rejoice to see it re-issued. The style and wit would be striking even if English were Dr. Frankel's native tongue. Equally obvious is his first-hand experience. He might have written a once interesting now forgotten commentary. But his purpose was to reduce the vast detail of oil operations to a few simple theses. That is the method of science. The organizing principles are: competition and monopoly; the interaction of costs, prices and production; economies of scale. These, and not the picturesque detail or even the flash of insight, are what endures.

Since then, the world industry has expanded manifold, and its center of gravity has shifted to the Eastern Hemisphere. Moreover, our knowledge of oil production has itself been transformed as cookbook recipes have been absorbed into a body of systematic knowledge, reservoir engineering. Our concept of its economic nature cannot but be affected. Yet the book is not obsolete. Those who have disagreed with the writer are - or should be - the most grateful for his having first blazed the trail through anecdotal irrelevancies to principles. This book deserves reading not as a pious exercise, but to gain understanding.

M. A. Adelman
Professor of Economics
Massachusetts Institute of Technology (M.I.T.)

Cambridge (Mass)
July 1968

INTRODUCTION TO THE SECOND EDITION

This book, written during the last year of World War II and published in 1946, has now been out of print for something like fifteen years. As no other book has come out which covered similar ground it has been on the 'Wanted' list of secondhand bookshops ever since and has become a collectors' piece.

In the first instance I had hoped to re-write 'Essentials' on a more comprehensive scale but the very scope of such an undertaking resulted in my continually postponing the project until such time when I could devote myself full-time to this task.

Meantime it has been suggested that, pending the publication of an altogether new book, the re-issue of the original text may be called for: by doing so it could be shown to what extent the scientific approach, to which Professor Adelman has referred, has lifted 'Essentials' above the level of the accidental. Obviously a great deal of what was written more than twenty years ago is now dated but if, as I hope it is, the main analysis is based on underlying fundamental principles, their validity can be measured by the degree to which they are relevant today. In fact the extent to which a 1945 approach is still valid in 1968 would tend to justify the claim that if one knows how to define the basic features of a situation, one can make meaningful statements about the likely future.

Thus the book is being re-issued exactly as it was originally published – warts and all – and I have added only a postscript – 'Essentials revisited 1968' – in which I have tried to elongate the lines of my thinking for them to reach the situation as it prevails today. The need for an Oilman's What's What, of which I talked in my Preface to the original edition, still persists.

London
September 1968

P. H. Frankel

AUTHOR'S PREFACE

WHO'S Who in oil has been frequently told. We know all about Rockefeller, his eccentricities and his charities; Deterding's triumphs are as familiar as his chameleon politics. Beyond the Napoleon of oil we have seen his Talleyrand, the resourceful M. Goulbenkian, and in the further shadows we beheld Knox d'Arcy of the Persian concession, holder of the key to an oil empire who did not trouble to turn the lock.

But there has never been an oilman's What's What to answer questions which everyone must at one time or another have asked himself. Is oil cheap or dear? Why is the industry dominated by a few super-firms? Do these giants impose their will unchecked upon the public? If the whole industry is run by the "Combine," how is it that there are still Independents alive and kicking? If the oil powers-that-be work hand in glove, why have price wars recurred as regularly as sun spots? Indeed, is the management of the industry under the control of benevolent wizards, as their hangers-on make out, or is the whole thing "just a racket"?

There is a good reason why the right answers have not been forthcoming. Those who really know all about it don't talk, and those who talk often don't know. Some American books, it is true, deal with the relevant aspects of the industry in a manner quite excellent, but they are rather too much concerned with U.S.A. developments of their day for their conclusions to be universally applicable.

Having waited some twenty years for a book on what underlies the structure of the industry, I made up my mind to assemble the basic facts myself.

Whatever success may attend my endeavour to paint a true and fair picture of the industry, will be due to my having had the opportunity of studying its actual daily working in a great many countries and on both sides of the Atlantic. Intimate contact with "Majors" and "Independents" in almost all the possible combinations and permutations has taught me that what is good or bad in the industry owes not so much to goodwill or bad faith of the protagonists as to inherent factors prevailing almost

everywhere which those who intend to pass judgment or to offer guidance must first try to understand.

In dedicating this book to my fellow-oilmen I sincerely hope that it will prove in due course to have given a fillip to the discussion of what really matters in our industry.

P. H. FRANKEL

London, *October*, 1945

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NOTE
on the Use of the Words
CARTEL——MONOPOLY——COMBINE

IN this book the word *Cartel* is not only used to cover international combinations of big companies. Cartels are, as far as my arguments are concerned, *all* " associations based upon contractual agreement between enterprises . . . which, while retaining their legal independence, associate themselves with a view to exerting a monopolistic influence in the market" (Article CARTEL in the Encyclopedia of Social Sciences Vol. III., p. 234, London 1930.)

In this context, however, the term *Monopoly* does not refer to rings or corners designed to create and exploit artificial scarcity but merely to indicate that the state of "free competition" in the text-book sense has been qualified by unilateral or joint action of some interested parties.

In accordance with usage in England the expression *Combine* relates to associations or groups whose influence in their market is paramount.

PART I

OIL AND PUBLIC OPINION

"Oil . . . the Medium of Miracles."
(*American advertisement*)
"Oil . . . the world's greatest lubricant and irritant."
("Oil Imperialism")
"The Amazing Oil Industry."
"This Fascinating Oil Business."
(*Titles of two recent American books*)

OIL holds a unique place in the popular imagination; it is always news. Oil is revered and oil is feared. Its power for good is eulogized with almost fanatic enthusiasm; its power for evil is exaggerated to the wildest extremes. People consider that anything may happen—and it probably will. Even some who know nothing of the theory of the underground formation of crude oil from ancient marine fauna, regard anything and everybody connected with oil as somehow "fishy".

The public has caught on to graphic tales of oil and oilmen. It has digested the fables of the oil industry and has only nibbled at the edges of the fact. Many features of the industry are entirely misconstrued because we have not bothered to discover the basic principles which underlie the imposing developments of its short but chequered history. The story of oil has been over-dramatized. The miraculous, the freak, the uncanny aspects of the industry have been overstressed. Why? Before embarking upon our task of examining the main principles which have determined the structure of the oil industry, let us consider how public opinion has come to look upon petroleum as peculiar and out of the ordinary.

RAPID GROWTH

Perhaps the most apparent reasons for this attitude are the rapid growth of petroleum as a principal factor in our daily lives and the stupendous expansion of the industry itself. Oil has conquered us by a series of swift attacks—the lightning, and perhaps rather unnerving, thrusts of a war of movement.

In 1900 the world's production of crude oil amounted to 21 million tons (and this was twenty-five times that of 1870). By 1939 it had multiplied itself again more than fourteen times, to a total of slightly less than 300 million tons.

Against this, compare other basic industries. Coal production doubled between the mid-eighties and 1900, and again doubled in the course of the next thirty years. The world output of steel in the nineteen-thirties was no more than three times its total in 1900. These industries developed at the same speed as, and within the structure of, an expanding industrial life. The development of the petroleum industry had a momentum of its own.

Such rapid expansion may explain much of the unorthodox character of oil, but it does not, of itself, explain the public reaction to the industry. Indeed, the output of motor cars, to say nothing of wireless, multiplied at a tremendous pace without creating similar reactions. We shall have to search further and for factors more specific to find what has given petroleum its special reputation.

UNCERTAINTY

One factor is that the process of finding crude oil to-day remains almost as much of a gamble as it was in the pioneering days of the industry—if a coat of arms is ever designed for oilmen, surely the diviner's rod should have pride of place. When you start to drill in unexplored fields—"wild-catting" the Americans call it—there is one chance in a hundred that you will strike lucky. However, if you do strike oil, you may make a thousand times your original investment, always remembering that even a stupendous gusher may, in due course, turn out to be a flop. Any venture in oil production may just as well lead to a bonanza as to bankruptcy; it is always a matter of "feast or famine".

Drilling for oil is a highly technical job which requires great skill and much hard work; but it is more than merely a means of making money. It combines all the joys and all the perils of the lives of a big game hunter and an explorer.

In some ways, however, the driller's life is closely akin to that of the farmer who, for all his know-how and all his toil, is in the last resort dependent on the weather, a factor beyond his control. Perennial grumblers though they are, both have the same fanatic devotion: the driller for the job in hand, the farmer for his own particular plot of ground.

There is an old story which shows the make-up of the oilman's character. A wild-catter died and, arriving at the Pearly Gates, he declared his earthly trade. St. Peter denied him entrance, explaining that the Department of Oilmen was already full. However, the

differences arising from their oil policies, can be found the following passage, which is extremely characteristic:—

> "It seems oil has fallen into bad odour. It is popularly believed to excite the worst passions, to rouse in businessmen a greed more consuming than the greed for gold, to move statesmen to Machiavellian designs. Even to have served with an oil company suggests having signed on with a pirate crew. Is not an oil magnate invariably more suspected than a coal baron? The wickedness of the latter is comparatively parochial, but the evil purposes of the oil magnate seem to reach across the seas to the far corners of the earth. A millionaire like Mr. Henry Ford, who produces automobiles in mass, is given a warm corner in the people's heart, but one who produces the fuel without which the Ford could not leave its shed becomes unaccountably unpopular".[1]

SOME CONSUMERS ARE SHORT

Note particularly the comparison with coal. In it are resolved the salient factors that differentiate oil from other industries. The major coal-consuming countries, that is, the industrial powers—U.S.A., Great Britain, Germany, France, and lately the U.S.S.R.—cover all or the greater part of their coal requirements from indigenous sources. Indeed, those countries became industrialized first where coal was readily available. It follows that coal is chiefly a domestic, a parochial problem, whereas oil is an international headache. It is true that the countries which consume most oil, U.S.A. and now U.S.S.R., are at the same time producers on the biggest scale, but *all* the other industrial powers—Great Britain, France, Germany and Japan—to say nothing of lesser countries, have to rely almost entirely on imported oil. Since petroleum is a matter of life in peace, and death in war, it is hardly surprising that in countries without oil attention was focussed on securing foreign resources by all possible means, ranging from financial investment to political influence and even military action.

SOME PRODUCERS ARE LONG

An extraordinary fact has rendered the problem even more delicate. While most of the great Powers have no oil, some of the richest fields discovered in this century have been located in undeveloped areas, in remote countries whose governmental methods were ill-adapted to coping with sudden developments of an industrial nature. It is hardly suprising that the foreign and, incidentally, domestic politics of such countries as Mexico, Persia, Venezuela, and Iraq, with Arabia as a late-comer, became part of the oil game, in which their Governments and peoples could hardly be more than pawns.

The argument which lays the blame for everything that happened at the door of the big oil interests is a specious one. It is the work of Nature that oil happens to be found in backward countries, and if their Governments are not democratic, in our sense of the word, oilmen must make the best of working with the powers-that-be. The inhabitants who had neither the inclination to search for oil nor the means to bring it to the surface, are in much the same position as a farmer who happens to own the land on which a prospector strikes oil. He expects a royalty, and a pretty good one, but would not dream of demanding all the proceeds.

Soon the position may be reversed. Within a decade or two things may change; oil may help in reviving the ancient centres of civilization between the Mediterranean and the Persian Gulf. It may help these peoples to become nations in their own right. Meanwhile the stress and strain caused by the relations of the great powers will direct their destinies. This fact, and not the alleged chicanery of oilmen or the evil designs of diplomatists is the true and inevitable cause of international oil disputes. In this workaday world one can hardly expect the interested parties to "play fair" when so much is at stake.[3]

There are other causes for public uneasiness about oil which, although they are of a domestic nature, exist in every country. They take the form of a deep-rooted suspicion. The oil industry is credited with being the happy hunting ground of a very few big corporations who wield for their own benefit the weapon of monopoly which they have obtained by stealth and ruse.

Here again Davenport and Cooke's comparison of oil with other industries deserves consideration. Why, indeed, do we feel that Henry Ford belongs to a different world from that of Rockefeller and Deterding? Making motor cars is essentially an engineering job, and those who first conceived the potentialities of the internal combustion engine and devised adequate methods of mass production became founders of great firms. It was extremely difficult, from a given stage onwards, for a newcomer to get in on the ground floor and to hold his own against the giants. Consequently the motor industry to-day is one of the most concentrated of all, but this concentration was originally caused by the technical advantages of large-scale production, whereas Rockefeller's rise—and, on a different plane, Deterding's career—was not due to their being the pioneers of the right idea

of *manufacture*, but to a shrewd appreciation of the *economics* of their trade. It was not that Rockefeller outmatched his competitors by superior refinery technique—Standard was always first class in this respect, but so were others—he owed his pre-eminent position to the fact that he was among the first to appreciate the structure of his industry. He detected the focal points whose control would yield a paramount advantage.

Concentration and integration have thus a very specific meaning in the realm of oil, and it was not by accident that here the time-honoured and hitherto respectable word "trust" came by its more recent and somewhat sinister meaning. It is perhaps not too much to say that the Sherman Act was mainly the reaction of public opinion to practices of big business developed first and foremost in the petroleum sphere.

PUBLIC RELATIONS

In the argument between Standard Oil, on the one side, the "Independents" and Federal Agencies on the other, Rockefeller's group was always on the defensive. For a generation or so he and his lieutenants got the best of it and did most of the business, leaving their opponents and critics to do the talking. Thus the greater part of public statements showed an anti-trust bias, and this has gone a long way towards shaping public opinion as it is to-day, or as it was for a long time.

Since the last war, however, the big oil companies in the United States have realized that "least said soonest mended"—a maxim which still appears to be valid in some countries, including Great Britain—is no longer good enough.[4] In the course of the last fifteen or twenty years, especially since the inception of the American Petroleum Institute (A.P.I.), the bigger concerns have no longer acquiesced in their traditional role of defendants; indeed, they have taken to blowing their own trumpets. If the public is not wholly convinced by their propaganda, this is certainly not due to any lapse in the forceful presentation of their case.

The fact that both sides of the question are now presented is beneficial; no longer is the conflict chiefly concerned with mud-slinging and recrimination, and reasoned argument has begun to replace venom and spite. The importance of this new attitude can hardly be overrated. It has meant, in the United States, that men of the distinction of Pogue, Gill, Swensrud, Pew, and the late W. S. Farish, have brought their wisdom and experience to bear

on some of the main problems of the industry, and have published many remarkable and interesting findings as a result. Their views deserve serious, if not uncritical, consideration, always remembering that they belong to the camp of the "major" companies. On the other side of the fence there is in the United States a number of economists, amongst whom Professor John Ise, of the University of Kansas, is undoubtedly the profoundest thinker, who are critics of the oil powers-that-be. John Ise, and also G. W. Stocking, have brought a new and objective point of view to bear on a discussion which was hitherto confined to "majors" and "independents"—both interested parties. These authors were the first to stress the important part public control could, and should, play in oil matters. Other writers—like W. J. Kemnitzer, who appears to prejudice his case by overstatement—maintain that "free competition" is a panacea, whose establishment would cure all the ills which infect the oil industry. The statements of the agencies, charged with the enforcement of the Sherman Act, also contain much valuable material, especially those made under the auspices of Mr. Thurman Arnold.

The contributions of European writers to the problem of oil economics consist mainly of descriptions of "Oil Wars," and the weakness of their books is that their knowledge of facts is so often in inverse ratio to the boisterous energy of their approach. Actually this is not a subject for the roving author. He seems inevitably inclined to stress the political, rather than the economic, aspect of oil problems, and to overrate the importance of the personal characteristics of chosen individuals.[5]

It is of supreme importance to realize that the big coups of oil kings are not the result of their "intuitions", but the joint product of a clear appreciation of the economic issues involved, and of the sheer, hard work of a great many people over a considerable period of time. The "Oil Napoleons" and "Oil Talleyrands" are neither supermen nor devils. It is time that the general public realized that these men were, and are, successful only if and as long as they devise their policies to meet the basic rules which underlie oil economics. If the public will make use of the given material and will insist on being supplied with such material if it is withheld, if it will weigh this material in the balance and draw its conclusions from it rather than from highly-coloured opinions, then at last the relations between the oil industry and the public will be on a sound footing.

BEYOND THE HEADLINES

This book is an attempt to bring our day-to-day experience in line with our knowledge of basic factors. All the statistics in the world are useless without a clear conception of their theoretical background. I have not attempted to whitewash or condemn either the big groups or their smaller competitors. My purpose is simply to show why certain ventures proved successful and why others failed. It is hoped that this study of the industry's history will give a clear picture of what really matters in oil.

We may find, as we progress towards a solution of the problem, that it is less involved than we had hitherto supposed, and that a sound oil policy—national and international—is not altogether beyond our reach. This discovery can hardly fail to make our mental picture of "Oil" less "fascinating", but at the same time more authentic, and should, in the long run, be to the advantage of the oil industry as a whole.

In conclusion, I commend to oilmen in all countries the statement of Congressman S. B. Pettengill, at one time a member of the Cole Committee:

> "Industry must predicate its political and special problems upon the faith that our people want to do, and in the long run will do, what is right—if they know the facts. I have that faith. And, if I were to venture a suggestion to the leaders of our enterprise, it would be to tell the truth, to act on the square, and take the public into their full confidence."[6]

NOTES AND REFERENCES

[1] This quotation from a work by Stanley Jevons does not actually refer to oil but to coal (*The Coal Question*, London, 1906, p. 2). It is obvious that oil shares with coal the function of being a pre-requisite of industrial civilization, but it will be seen later that the economics of solid and liquid fuels are entirely different in other respects.

[2] E. H. Davenport and Sidney Russell Cooke, *The Oil Trusts and Anglo-American Relations*, London, 1923, p. v.

[3] Despite the fact that the bulk of U.S.A. and U.S.S.R. production never entered the export market, petroleum occupied first place amongst raw materials exported before the war. According to League of Nations figures, total world exports of Crude Petroleum, Petrol, Gas and Fuel Oil amounted in 1938 to 1,140 million "new gold dollars" as against $530 million for Coal, $435 million for Wool, $325 million for Copper, $287 million for Rubber, and $149 million for Iron Ore. (Quoted by P. Lamartine Yates, *Commodity Control*, p. 8, from League of Nations, *The Network of World Trade*, Geneva, 1942.)

[4] The practice of big corporations volunteering information rather than withholding it first became popular in the U.S., but it is spreading to other countries. Such a change of heart is well illustrated by Campbell Osborn *Oil Economics*, New York and London, 1932:—

"An oilman of the old school once said that, when it was almost impossible to ascertain how much oil competitors were producing and selling, and what prices they received, he could make a profit; but in modern times the oil business is public information, and there is no money in it. This kind of thought is obsolete in modern industry."

[5] For a comprehensive list of publications, see the Bibliographical Note on p. 165 *et seq.*

[6] Samuel B. Pettengill, *Hot Oil*, New York, 1936, p. xv.

PART II

ECONOMICS OF A LIQUID

THE *leitmotif* of any discussion about petroleum must be its liquid state.

The problems involved will be considered first against their technical, or rather their scientific, background; the fact that most petroleum products are volatile liquids delimits their possibilities and determines their role among similar or competing materials.

Starting with this knowledge, the specific features of the exploration of oil-fields and the exploitation of oil-wells will have to be investigated.

The next stage is refining. Here the fact that a liquid cannot be "handled"—in the original sense of the word—fixes the pattern of the industry. Refining requires little labour but elaborate plant.

Lastly, we shall see the consequences of the liquid state of petroleum in transport and marketing where it entails the use of specialized equipment which puts the oil trade into a category all of its own.

We shall discover that there exist certain traits which permeate through the whole of the oil industry, and only by appreciating their common denominators can we understand properly how vital it is to think always in terms of the *whole* industry rather than to try to solve the problems of any one of its component parts as if it were self-contained.

Chapter 1

THE ROLE OF LIQUID FUELS

TO go back to first principles—what functions do petroleum products actually perform?

(*a*) As kerosine and fuel oil they provide gases which burn, affording light or heat.

(*b*) As gasoline and diesel oil mixed with air they explode and generate power.

(*c*) As lubricating oil they form a tough film between moving metal surfaces.

Only the last of these does not materially change its state when it is employed, all the others are either gasified immediately before they are used or in the course of their being put to use.

Since it is a combustible gas that is required, one might expect gases to be to the fore, but the supply of "natural" gas obtained from wells is limited and, as a result of transport problems, its use is confined to certain areas; furthermore, storage of gas is difficult, and demand on a large scale can only be satisfied by converting liquid or solid materials into gases at a convenient stage.

It is perhaps an appropriate speculation that the particular value of liquid hydrocarbons derives from their being easily gasified.

Only in the sphere of the direct generation of heat by burning do solid fuels—coal, wood, or peat—compete with liquid petroleum; in this instance coal and fuel oil perform like services, but their storage and transport requirements are dissimilar, as we shall see presently.[1]

Such competition does not occur as far as lighting and the generation of power by explosion is concerned. An efficient lamp could not be lit with a solid, nor could any of the internal combustion engines—as they are known to-day—be run on coal in its original state; neither would have been developed had there not been suitable liquid fuels available. The kerosine lamp, of course, is not the only source of light—town gas is obtained by carbonizing coal and electricity by burning it—but where that type of lamp is required, a liquid petroleum product will give the

best performance. Nor is the internal combustion engine the only source of power—the steam engine, especially the steam turbine—continues to be entirely adequate for a great number of purposes. But where such attributes as mobility, quick starting and acceleration, high speed, etc. are essential, petrol or diesel engines, both running on liquids, will prevail and the most readily available fuels for these types of engines are again petroleum products.[2]

The salient factor is *that solid fuels have first to be burnt to raise steam, and only then will the steam pressure drive the engine; whereas, by using a combustible gas or a material which can be gasified easily, we "eliminate a separate energy-converting unit"*[3] *and bring power to bear in the most direct form.*

That solid materials *can* be transformed into liquids, though commonly assumed to be a challenge to the preferential position of petroleum, is in fact the opposite Apart from carbonization where liquid products are obtained alongside gases, the main processes of this kind add hydrogen [4] and such a procedure only serves to demonstrate that *solid fuel has to be liquefied to make it conform to the pattern of petroleum*—only then will it be fit to cater for internal combustion engines. The fact that solid fuel is one remove further from the desired state is of overriding importance.[5]

At this stage it is not possible to probe any deeper into scientific questions, but it may perhaps be useful to present in a nutshell the comparative merits of the various means of obtaining illuminants and engine fuels, even if this entails some over-simplification.

What is wanted, reverting to the main point, is a combustible gas of a certain type, whose sources may be listed as follows:—

1. *Gaseous Fuels*, natural and manufactured. While the natural material is very valuable, the areas where it may be found are limited. The transport of natural and of coal gas through pipes is easy, almost elegant, but its scope is restricted and overseas transport impossible. Storage, however, is the bottleneck: large containers or high pressures are required for all gases, and this creates great difficulties both for the producer and the user.[6]

2. *Petroleum.* The several products derived from crude are segregated by distillation, which is a simple, effective, and therefore relatively cheap process; indeed, compared with some chemical reactions used in synthesizing liquid fuels, it is an almost "natural" procedure. Gasification takes place at the most convenient stage—in the lamp or engine. Storage *and* transport are

straightforward, stream-lined operations. All the advantages of a gas obtain (pipe-line, etc.) without any of its drawbacks.

3. *Coal.* Labour requirements in mining are considerable. Transport is easy enough, but storage is difficult. Furthermore, carbonization is dependent upon a balanced outlet for by-products and hydrogenation is still costly.[5] There are considerable possibilities, however, of one day using coal for purposes for which petroleum is the most adequate material at present. Their actual importance will depend as much upon improvements in the technique employed as upon the quantities of cheap crude oil available in the future.

4. *Shale.* Shale oil is derived from a kerogeneous solid by destructive distillation, and there is no basic difference between it and crude oil originating from a well. The preference for crude as opposed to shale oil is only a question of comparative cost.[7] Should crude oil proper become scarce and dear, or should an improved process cheapen the treatment of shale, it would mean nothing more than that the basis of raw material for petroleum refining would have been broadened. As long as crude is readily available, at about the present level of cost, there is little incentive to treat a solid in such a way as to obtain a liquid which can be procured naturally in its desired state.

Having explored the essential implications of the liquid state of petroleum we can profitably investigate what this involves in the respective stages of the industry.

Chapter 2

CRUDE PRODUCTION

THE governing factor in the economics of crude oil production is that exploration and drilling are very expensive, while the actual cost of lifting the oil from the sub-soil, that is, the cost of exploitation, is relatively low. In other words, *capital investment is necessarily heavy, whereas current expenses are light.* This proportion of fixed and variable cost provides a set of circumstances characteristic not only of the production side of the industry, but also of some of its later phases.

THE JOB OF FINDING THE OIL

In order to appreciate the problems and difficulties of locating oil and getting at it, we must bear in mind that it is to be found in porous rock at various levels deep under the surface and that, in spite of all the knowledge and experience gained over almost a century, the occurrence of oil in profitable quantities at any given point cannot be deduced theoretically, but can ultimately be proved only by the act of bringing down a bore. This obviously leads to the drilling of a great many holes which give no tangible result, which are "dry." Indeed, it has been estimated that in the United States one-quarter of *all* holes yielded no oil [8], and in the case of drillings in comparatively unexplored areas—for which the Americans have coined the expressive word "wild-cats"—the percentage has been reckoned as high as 95 per cent.[9]

This is one of the reasons why crude production has always been beset by the problem of overheads. In the long run, the productive wells have to "carry" those that are unsuccessful, and the comparatively high expenses of exploration are certainly a paramount factor in making up the cost of crude. Since the greater part of these costs is preliminary to actual production, it is imperative that the operator extracts the maximum from a producing well, because his cost per barrel decreases rapidly as output increases. Owing to the unorthodox character of crude production, to which I referred in the introductory chapter, the aggregate cost of achieving production is seldom borne in mind and, therefore, not always recovered.[10] It does not seem altogether improbable—since dead money tells no tales—that, on the

whole, there was no profit in U.S.A. production and that, in fact, more money was lost than made. The occasional stupendous fortunes derived from a lucky strike boost the hopes of would-be investors; the many failures are forgotten. In Adam Smith's words: "Man is an incorrigible optimist. He despises future risks and under-insured trusts blindly in his star." Or, if you prefer the more dignified pronouncement of a modern economist:—

> "The shrinkage of the value of old investment on account of the lack of foresight of investors in the past does not seem to have had a deterrent effect on the conduct of new investors."[11]

But, even without taking the heavy cost of exploration and of dry holes into account, it is still true that the drilling cost of any individual well is out of all proportion to the expense of getting the oil to the surface once the productive stratum is reached.

There is such a variety of drilling conditions in different fields that it is very difficult to make any general statement as to the set-up of oil-well costing, but experience tends to show that expenditure on direct lifting is between one-fourth and one-fifth of the total cost of finding and producing oil.[12]

When, a few years ago, Myron M. Watkins enumerated "the three distinguishing characteristics of crude petroleum",[13] he mentioned first "exhaustibility", to which I do not pay as much attention as he did, since it is a feature shared by all mineral resources, though in different degrees. The other two characteristics were "concealment" and "fugacity".

So far I have only referred to "concealment"—that is, to the difficulty of locating the material and of getting at it—which gives such a decided twist to the economics of producing crude. But Watkins' last characteristic, the "fugacity" of crude, is of equal importance; indeed, it has received more attention than any other like problem. That the oilman's interest should have focused on "its fugitive character arising from its fluidity,"[13] is probably due to the fact that "concealment" is a factor in the *struggle of Man against Nature*, whereas "fugacity" is a part of the *competitive contest between Man and Man*, and, consequently, more exciting.

LAW OF CAPTURE

In the United States, as in many other countries, the rights to subsoil resources belong to the owners of the land[14] and, as the boundaries of several properties may cut across what is popularly called an "oil pool"—and, more correctly, a rigid sponge or an area of permeable sands—there may arise the problem of an

interplay of several interests drawing upon one common source of supply. As fluids find their own level, and as any crude which is within a certain structure of porous rock tends to migrate towards the point of lowest pressure, the way in which one owner works his "lease" will inevitably affect the interests of all the others. The most common solution of this problem, an automatic one as it were, is to leave it to the competing parties to fight it out. This conception was based on the "law of capture," according to which a wild beast is deemed to be the property of the owner of the land on which it is slain or intercepted. Whatever repercussions this law may have had in the realm of hunting, as far as oil is concerned it has, of necessity, led to a rapid development of the resource. It has now, for very good reasons, become fashionable to scoff at such methods of rapid development, but, sound as the arguments against them are, it is doubtful whether the "oil age," i.e. the swift progress of the internal combustion engine, could have come off without the unrelenting pressure exercised by an almost too plentiful supply of cheap oil. It may well be that these somewhat primitive methods were exactly what was required to make the young industry, in the first instance, aggressive and, in due course, great.[15]

TIME *IS* MONEY

The main factors the crude producer had to consider, in the circumstances, were:—

1. The necessity of quick production to make his heavy investment pay as soon as possible.
2. The commitments towards the property owner who was to receive a royalty,[16] and who usually granted the lease on condition that it should be exploited within a specified time.
3. The danger of "his" oil being drained away by his neighbours.

All three points make for swift action, especially in the case of operators with limited resources. But the third point is the most potent of all when you remember that this type of producer is usually operating in fields where property holdings are in many hands.

Pettengill puts it very neatly:—

> "Given two thirsty—if not greedy—boys, two straws, and one glass of lemonade, and you have the cosmos in microcosmos. It becomes a sucking contest in which the one who sucks the *least* is the bigger *sucker*!"[17]

Such circumstances brought about the system of "offset wells"; the man who developed a lease tended to start drilling near its boundaries, and this forced his neighbour in turn to forestall him by doing the same on the other side.

These tactics led to cramped conditions and to a spacing of wells according to other than purely technical considerations. But the real failing of this system is the effort wasted in drilling more holes than necessary and the loss of underground gas pressure caused by opening too many "valves" at any one time.[18] Even if those who maintained, for instance, that in the East Texas field "some 21,000 of the 24,000 wells drilled were unnecessary"[19] were guilty of overstatement, there can be little doubt that operators in subdivided pools pay for high initial yields by impairing seriously ultimate crude oil recovery.[20]

CONSERVATION

The case for considering any one pool as a "unit" whose exploitation is to run on communal lines, giving each holder of a lease an "undivided interest in the entire area",[21] is a very impressive one.

The justification for curbing the rights attached to the individual lease by utilization and the still more sweeping principle of *proration*, i.e. of limiting the "allowable" output, lies in the belief that uncontrolled exploitation spells "waste." It must be clearly understood that people mean quite different things by waste; some refer to the reduction of the aggregate quantity of oil and of gas obtained from a pool by inadequate production methods—"technical" waste, for short—while others mean "commercial" waste, due to the production of more oil than can be disposed of at economical or remunerative prices, with the after-effect of a possible shortage at a later date.

It is perhaps significant that the idea of "conservation" made very little headway, even after Coolidge had initiated the Federal Oil Conservation Board in 1924, at a time when supply did not seem equal to demand. It was not until the stupendous glut in 1927, followed by renewed "over-production" scares in the early 'thirties, that a powerful section of the American oil industry attempted to tackle the problem seriously, and managed to enlist the support of the Roosevelt Administration. The fact that the industry awoke to its long-term interests only when its short-term business prospects were threatened may be a reflection upon the acumen of the majority of its leaders, but it does not affect the

value of the principles involved. The wisdom of "planning" the operations of extractive industries, so as to avoid violent oscillations of stocks and prices, may be a debatable point, and in respect of "economic waste" the oil industry is on the same footing as others, but, if we visualize economic waste against the background of its technical equivalent, we are bound to appreciate that *both together* are somewhat formidable.

If industries, whose raw materials are in unlimited supply and in which exploitation methods do not necessarily imperil the future, elect to put their trust in day-to-day expediency reflected in the workings of a free market, that is their business. But if ever the case for co-ordination of interests has been made, it is on the producing side of the oil industry.

Chapter 3

REFINING

COST: FIXED AND VARIABLE

THE character of an industry is to a great extent determined by the relation of its variable to its fixed costs. At one extreme is the entrepreneur who "gives out" to outworkers who use their own tools; his manufacturing costs are variable since they consist entirely of wages paid to casual piece-workers. At the other extreme there would be an imaginary plant—automatic, requiring no attention, and having a negligible fuel consumption.

This first type of industrialist can, provided there are suitable applicants for his type of job, hire and fire at will; he can adjust output instantly and completely to meet changing market conditions because all his costs are variable. The owner of the automaton, however, has only "fixed" cost and, even if the plant is shut down or run at reduced throughput, he must still allow for interest and depreciation at almost the same rate as when it is operating to capacity.

This does not mean that high fixed cost makes for bad business as compared with "light" industry. But it does mean that the policy of an industry with heavy investment and low variable cost must differ from one in which wages and power are the biggest items. The industry in which cost rises and falls according to output will, generally speaking, show considerable elasticity, that is, it will contract and expand easily to adjust itself to the state of the market. If the bulk of your cost is directly attributable to actual production, if it is so-called *prime cost* you will obviously tend to adjust your output without delay to the amount you think you can dispose of at a price which, at least, covers this cost.

If, on the other hand, the greater part of your expenditure is *fixed cost* which is incurred independent of output, the prime cost of each individual article produced is low and prices can fall a good deal below the level at which *all* costs are covered and real profits are made, before it pays to reduce the rate of production. Such industry is therefore less elastic in so far as—once the invest-

ment has been made—the incidence of fixed cost makes full utilization of the plant imperative and production can easily get out of hand. If your fixed cost (interest, depreciation, maintenance, and administration) is N, it affects each of 100 units produced to the extent of $\frac{N}{100}$; if, *with the same equipment*, you can produce 150 units the cost per unit will not be quite as low as $\frac{N}{150}$, since not all costs are fixed, but it will be sufficiently near this figure to induce you to strive for maximum output within the limits of your plant capacity. If I were to draw a graph showing total production cost against total output the curve for an industry with high variable (prime) costs would show an almost straight line, whereas the one with high fixed and low prime cost would be represented by a very flat curve.

There, in other words, the cost per unit goes down rapidly as production is stepped up. It follows that once the plant is built, it is difficult to keep its throughput down.

Therefore, in "light" industries supply will tend to follow smoothly the fluctuations of demand whereas industries requiring "heavy" investments will work spasmodically, either outpacing demand or falling behind it.[22]

Students of the oil industry can have no difficulty in deciding into which category it falls. We have seen how much the cost of exploration and drilling outweighs actual lifting cost in production, and this ratio obtains, though in a different way, at the refining stage.

Many problems of organization are common to all industries, many are peculiar to some. In the next few pages I hope to give a clearer picture of oil refining by comparing it with other industries.

TEXTILES

In the *textile industry* variable cost usually outweighs fixed—under primitive conditions man-power is *the* relevant factor, not only in the more specialized stages of finishing, printing, etc., but even in spinning and weaving. In one of the illuminating surveys of British industries undertaken by P.E.P.[23] it is shown that about 35 per cent. of the total cost of cheap cotton goods, including the value of the raw materials, can be attributed to labour.[24] Even on automatic looms wages amount to 50 per cent. of all production costs, including interest and depreciation.[25]

It follows that—at least before the advent of rayon—the textile industry was made up of a number of small and medium-sized

enterprises whose employment of labour and output of products fluctuated considerably. Another special feature of this industry is that its works are composed of a great many small units—spindles or looms—and that it is comparatively easy to continue running some of them while others are idle; up to a point each spindle or loom is a plant of its own.[26] This creates conditions of high elasticity compared with industries of the all-or-nothing type where the plant units are very big.[27]

COAL

In the *coal industry* investment is heavy. Estimates are inevitably vague, but it is calculated that the capital required for establishing production of bituminous coal is somewhere in the region of £1 per ton annual capacity of the pit.[28] The average life of a coal mine is long, however, and this lightens the burden of depreciation; indeed, semi-official calculations referring to conditions in the United Kingdom during the 'thirties allowed only 3d. per ton of coal produced for amortization and interest on capital.[29]

All other items of costing in coal-mining are dwarfed by the amount required for wages. In 1938, wages were as much as two-thirds of the "total net cost" of coal-mining (including royalties), and wages and salaries were about 60 per cent. of the total cost, including depreciation and non-personal overheads.[30]

Although wages are, or at least were, of greater importance in Great Britain than abroad—partly owing to the structure of seams and the fact that her mines were, on the whole, less mechanized than those in foreign countries—wages still exceed 50 per cent. of total cost almost everywhere.[31] Some of the wage-earners do miscellaneous jobs, or are concerned with maintenance which must be carried on independent of output, but the work of the great majority can be directly attributed to the amount of coal hewed, lifted, sieved and graded. This characteristic makes for high prime cost. Despite the investment factor being so much more important than in "light" industries, coal-mining has a safety valve—operated by an increase or decrease of labour employed—the existence of which affords a considerable degree of elasticity.

The possibility of reducing output without altogether disastrous consequences resulted often in comparatively stable coal prices, even in the absence of hard and fast agreements. This is a very complex problem upon which I can only touch here, but the curve of prices and output of coal in the United Kingdom is sufficiently

descriptive for our purpose. Whereas output fell from 257.9 million tons in 1929 to 208.7 million tons in 1932 (about 20 per cent.), average prices in pence per ton were 161.2 in 1929 and 159.1 in 1932 (a reduction of only $1\frac{1}{4}$ per cent.).[32] Writers of text-books on the coal industry are wont to stress the consequences of the difficulty of shutting down a pit and of the considerable cost of "care and maintenance" involved, but can there be a better proof for wholesale dismissal of labour being the industry's emergency exit than the 340,000 British miners unemployed in 1933—about one-third of the available men?[33] What matters to us is that this reduction carried out with a view to coping with the slump in the sales of coal, which was partly due to the world-wide depression after 1929, was not so much caused by the elimination of colleries, by total shut-down, as by the general incidence of fewer shifts being worked.[34] That working at a reduced speed, so to speak, is a possible solution for coal-mining all over the world, is proved by figures which indicate that the number of days worked annually by the bituminous mines of the United States were as low as 146 in 1932 as against 219 days in 1929.[35]

These facts have shaped the economic history of coal-mining. *By the intake or dismissal of labour, output can be adjusted to market conditions, and this enables each individual colliery to follow some sort of a rational production policy.* This, together with the comparatively small size of collieries[36] and their wide dispersal over different parts of the country, has resulted, until fairly recently, in the highly competitive structure of the United Kingdom coal-mining industry with little need or incentive for horizontal organization by concentration or by "market understandings".[37] Such organizations as came into being in the United Kingdom after the last war owed their existence rather to pressure from outside than to spontaneous forces within the coal-mining industry itself.

The immediate necessity for co-ordinating machinery is confined to industries in which the *individual* unit cannot easily adapt itself to changing conditions, and in which a new equilibrium can be established more smoothly by concerted effort.

STEEL

Steel presents a somewhat different picture. Labour has a considerable share in its cost—indeed, about 50 per cent. of the production charges[38]—but these figures do not take into account

interest or depreciation, which is of much greater importance than in coal-mining. Further, the role of labour is different from that in either the textile or coal industry, as it is less directly attributable to separate batches, as it were, of the output and rather to the running of the whole plant. In short, the sector of the total manpower which can be reduced or increased according to output is much narrower, and thus labour assumes the character of an "overhead."

The difficulties of adjusting steel production to the fluctuations of demand[39] have encouraged regulation of the market by merging firms in combines and by forming national and international cartels. The paramount technical advantage of large-scale production in the steel industry also assists this tendency, and whenever an industry is made up of a limited number of concentrated and highly capitalized units we find an inclination to combine so as to safeguard heavy investment. This position is neatly described by C. G. Allen in his *British Industries and Their Organization.*[40] In this book he deals first with conditions of higher elasticity, such as I have described in the case of the textile industry, then he continues:—

> "With the rise in the scale of industry and in the amount of fixed capital employed, the response of producing capacity to downward movements in price became less immediate. The elimination of the unfit was a slow process when an industry was in the hands of firms with great resources. A concern working with a large fixed capital was ready, in time of depression, to accept orders at any price which would contribute something to its heavy standing charges. Under these circumstances, a long period of unprofitable prices might ensue without leading to the extinction of surplus capacity, and the difficulty of re-establishing equilibrium was thus increased. The result was, naturally, to weaken the industrialists' belief in the beneficence of free competition, and efforts were made by them in every manufacturing country to create combinations for the purposes of maintaining prices at profitable levels."[41]

RUBBER

We shall find, in conclusion of our rapid survey of some of the most characteristic examples of contemporary industrial life, the *growing of natural rubber* beset with almost all the features of an industry which involves the problems of high investments and overheads. The salient factor in the production of plantation rubber is that tapping of the trees cannot start earlier than six or seven years after planting. This time-lag involves an almost inordinate capital outlay and, consequently, it is absolutely necessary to produce as much as possible as soon as it is technically feasible. The market situation is rendered still more delicate by

the necessity of planning production long before any reasonable estimate of demand can be made.

The extremely violent fluctuations of rubber prices[42] during the inter-war period—the highest price was six shillings and the lowest 2½ pence per lb.—were a direct result of conditions as they are described by an expert:—

> "The bulk of the supply of plantation rubber is notoriously inelastic to price declines. The incidence of high fixed costs leads estates to enlarge in the face of declining prices. The majority of Malayan smallholders who live almost exclusively on the sale of rubber tend to follow the same policy."[43]

The various schemes of voluntary, and even compulsory, regulation of rubber production are, as Liefmann once said of cartels and trusts in general, "children of distress"; they have become indispensable because of the lack of natural balance, which is the immediate result of high capitalization and the absence of those "safety valves" that exist in the textile and even in the coal industry.

Strangely enough, man-made rubber is under very much the same spell. The synthetic product, whether originating from petroleum or not, is made by a process that has much in common with modern oil refinery technique—here we have a close link with the main subject of our investigation. K. E. Knorr, the American expert quoted above, makes it quite clear that

> "the cost structure of the synthetic rubber industry shows the same importance of high fixed costs that characterizes the estate company. Therefore, unless the industry is monopolized, the reaction of synthetic manufacturers may well be similar to that of the estate producer. If the industry is monopolized, price stability will be bought dearly at the cost of high rubber prices."[44]

Against this background of other industries the economic problems of oil refining are developed in full relief.

LABOUR IN OIL REFINING

Labour is of high quality, but, as far as numbers and the total of wages are concerned, it is of limited importance. The whole of the U.S.A. refining industry, with an intake of 175 million tons of crude in 1939, employed no more than 80,000 men.[45] This is only about 8 per cent. of the total number of employees of the whole petroleum industry, marketing included. The refinery and pipe-line division of the United States oil industry showed before the war a capital investment of $43,500 per worker[46]: if we take an over-all depreciation and obsolescence rate of 10 per cent. per annum, which is, whatever the tax collectors say, prob-

ably rather on the low side for this quick-moving industry, and if we take a figure of 4 per cent. for interest, we arrive at an annual amount of more than $6,000 per worker, whereas the average wage of refinery operatives was only $1,718 per year.[46] This does not mean, however, that refinery employees are poorly paid, on the contrary, their earnings are among the highest, and their hours per week among the lowest, in all United States industries.[47]

It only goes to show that in the oil industry, whose total labour costs—according to a 1943 estimate of O.P.A.'s Labour Advisory Committee—amount to only 10-15 per cent. of total costs, man-power does not really influence financial results. Certainly its traditionally excellent labour relations do credit to oil refining all over the world, but this happy state of affairs is not, as is sometimes supposed, due only to the virtue and public spirit of the industry's leaders. It nearly always pays to treat a skilled and specialized man well, but it is much easier for an industry whose wages are a minor item to live up to this principle than for one which its wage bill makes or breaks. The central problem of refining economics is what has been called the "gap between the prime cost and the total cost."[48] The former is very low, indeed more than half of the total cost is in overheads and cannot be directly related to the amount produced. The famous "last 10 per cent." of a refiner's throughput which involves next to nothing in cost apart from chemicals, and can be sold at any old price without making the accountants blush, is firewood for kindling price-war conflagrations. Once a refinery is built its owners are prisoners in the hands of their investment, none of the emergency exits of other industries are open to them; if it comes to the point either a refiner will manage to win through by fighting for a market which will absorb his full-scale production, or he will perish, unless, of course, there is some arrangement which will compensate low throughput by securing high prices.

FULL EMPLOYMENT OF PLANT

Briefly, refining is a matter of equipment and the success of a plant depends on whether proper use can be made of it or not. It must work to a stable programme and as nearly as possible to capacity.

The process of production in a modern refinery is, by its very nature, continuous. This did not obtain to such an extent as long as the original methods of batch treatment prevailed both on the distilling and on the refining side, but pipe still, cracking and

solvent refining plants are designed to run for a long stretch, only shutting down for cleaning and maintenance. As it is entirely unsatisfactory to start up and close down any of these plants at frequent intervals—on account of heat economy and off-grade products derived at the beginning and at the end of each run—the alternatives to working at much less than the rated capacity are: continuous operation at reduced throughput or plant shut-down for a period of months which involves the availability of sizeable storage facilities to tide regular business over the recurrent shut-down periods.

The former method is appropriate for moderate deviations from rated capacities; a reduction of 5 or 10 per cent. is of little importance, but the curve of cost per unit rises steeply thereafter, because by this method practically *all* items of expenses down to fuel cost remain unaltered, and the plant manager soon reaches the point where total, if temporary, closing down is the better way out. This applies particularly when, by nature of the plant, corrosion of vessels and damage to boiler pipes, etc. is less when the plant does not operate.

In either case, however, the refiner is faced with the necessity of providing not only for interest and depreciation, but also for practically all his personnel.[49] The position is aggravated still further by the peculiar function of the distillation unit within the framework of a refinery. We have seen that the spinner or weaver who works a number of units in parallel can carry on with only some of them working, and that in a colliery only general maintenance is performed in those parts of the pit which are temporarily out of commission. But in a refinery—and incidentally in a steelworks—it is the main unit, the lifeline as it were, that is affected by fluctuations in throughput. Distillation plants and blast furnaces can neither be by-passed nor can they, for technical reasons, be broken down to the capacity of any one of the several treating and finishing plants which rely on the primary stage for their intake of intermediate products.

The refinery also relies on reasonably balanced outlets for quite different products which, especially before the advent of cracking and hydrogenation, were anything but readily interchangeable. It is, however, the superiority of large-scale plant, and not only the working to capacity, which is such a cardinal feature of the refining industry. It is not only the usual policy of "safety in numbers," nor the familiar advantage of doing something in a big way; it is due to the fact that the development of refinery

technique during the last thirty years—the general progress from the era of topping plants through that of thermal cracking to the current stage of complete refineries incorporating catalytic cracking, reforming and solvent refining plants—has put a premium on refining in big, compact units. In the early days a big refinery was practically an outsize replica of a small one; to-day refining under conditions made possible by up-to-date technique is impracticable[50] below a throughput, say, of 500,000 to 1,000,000 tons per annum (10,000/20,000 barrels daily). The implications of this development can perhaps best be gauged by one more comparison with other industries: we have already noted the reactions of the small-scale colliery, heavy on labour, to market fluctuation; the mechanized one, usually the bigger of the two, is less elastic as can be seen in A. M. Neuman's *Economic Organization of the British Coal Industry* (p. 135):—

> "Parallel with the progress of technique, the size of the working industrial unit is being continuously raised, and a maximum limit has not yet been reached in the majority of cases. Hence arises the propensity towards concentration upon a lesser number of large and efficient collieries. Secondly, with the advance of efficiency and rationalization the significance of working the mines at fullest potential capacity becomes more pertinent. The heavy overhead charges must be kept low per unit of product to make a more advanced method of production worth-while. Consequently the tendency towards full capacity employment is greater in the new and well-equipped districts like South Yorkshire than in the old ones."

This is how the peril of the highly capitalized unit is described by a Belgian student of the coal industry:—

> "As a matter of fact, it is in the short run not the average cost, not even the marginal cost, which determines the market price, but the marginal prime cost. Therefore it will be the most mechanized collieries which, in spite of their being the best in the long run, will suffer most by reduced output at a time of a slump in the market."[51]

The highly mechanized colliery is thus, if to a lesser degree, subject to the same problems as refining; concentration into bigger units and a rise of fixed costs tend to produce the same trends in coal-mining which have always, but recently to an increasing degree, prevailed in the oil industry. Indeed, with the progress of complete mechanization in more and more industries the symptoms characteristic of oil refining are the rule rather than, as they were two decades or so ago, the exception.

TREND TOWARDS CONTROL

All these features point in the same direction; they show petroleum refining hurried by unavoidable technical forces

towards working to capacity and concentration in big units. The ensuing competitive position is one so strained that relief must be sought in one way or the other. The alternatives are a kind of struggle for the survival of the fittest, who eventually *controls* the market, or co-operation of the competitors with a view to *regulating* the market. This is, indeed, though petroleum provides a classical example, a general problem of contemporary industrial life as it has been described by J. M. Clark, an American economist, in his remarkable *Studies in the Economics of Overhead Costs* (Chicago, 1923, p. 146):—

> "Where single plants are large, the forces making for both vertical and horizontal combination are strong. Since large plants are the natural accompaniment of the use of large proportions of fixed capital, it follows that businesses of large fixed capital tend to develop both horizontal and vertical combinations. We have also seen that vertical combination extends the possible range of monopoly control, while the connection between horizontal combination and monopoly is obvious. Added to this is the well-known fact that it is the industries of large overhead costs in which unrestrained competition develops the cut-throat character which well-nigh forces the producers into some sort of combination, formal or informal, in order to avert disaster, at or least develop a standard of business practice which refrains from the tactics characteristic of unrestrained competition. . . . Thus large scale production, combination, and monopoly or restricted competition are all more or less bound together, and all occur in the same class of industries."

Chapter 4

TRANSPORT AND MARKETING

IN his book on the British Gas Industry[52] Philip Chantler points out that its structure would have been entirely different had the individual consumer been able to buy the gas "ex works" and to take it away in containers. The fact that such a form of delivery was impossible, and that an elaborate system of underground pipes was required to solve the specific problem of carrying gas to the consumer created the set of circumstances which resulted in the establishment of local monopoly and, as its concomitant, public regulation. An American textbook on Public Utilities goes one step further. There it is stated:—

> "In water, gas and electric current the delivery of the commodity produced is an integral part of its production, and it is of a sort which makes a simplified system of distribution by far the most economical."[53]

SPECIALIZED EQUIPMENT

In the same way the job of transporting a liquid is "an integral part of its production", and it has always been of vital importance for the oil industry as a whole. At the user end it is the same story, and boiler fuel oil for ships is a case in point: its ascendancy over coal is partly due to its capacity to flow right into the burner with no need for shovelling and stoking. The very process of using the fuel is a transport function.

The history of petroleum would have been different if the material to be burnt in lamps or in internal-combustion engines could have been made into a powder, packeted, and sold in general stores. Lubricating oil, the one liquid petroleum product, used in comparatively small quantities and the least inflammable of the range, is a borderline case and, when packed in small containers, does not provide a particular transport and marketing problem. Solid products like paraffin wax seem to belong to a different world altogether. Crude oil, however, and the principal products—kerosine in its heyday, engine and boiler fuels in our times—are handled in large quantities, "in bulk", and there *the main consequence of the liquid state of petroleum is that it requires specialized equipment.*

Solid substances usually share means of transport and places of storage with other materials. The same truck or lorry can carry coal, iron, steel or timber and the same warehouse can accommodate all sorts of raw materials or finished products. Large-scale transport of a liquid, however, can only be effected in tank wagons or pipe-lines. These are specially designed for a liquid—the same applies to tank installations—and are thus no good for anything else.

The consequences are:—

(1) Whereas other trades can rely upon means of transport catering for a host of materials and are thus not compelled to provide machinery of their own, the oil industry has always had to consider transport as being a major problem to be solved within its own orbit.

(2) This being the case, transport is not, as it is for some other industries, an accidental item.[54] It is a constituent factor which has considerably influenced the structure of the industry.[55] As a matter of fact, the development of oil economics can best be described in terms of transport: first, it was the epoch of the barrel (a barrel is still the unit of measurement for crude and heavy oils), then came the era of bulk containers on their own wheels and, as consumption gets bigger and more concentrated, so the pipe-line age draws nearer.

(3) We are faced with some of the familiar features of crude production and refining. As Shuman has put it:—

> " Crude oil and the leading refined products of the petroleum industry . . . are constitutionally liquid. They are therefore subject to flow, whether of gravity or pressure type. . . . In the field of oil transportation, consequently, labor is of minor significance and fixed investment of great importance. Since, up to the operating limits of the transportation device employed, costs tend to be of decreasing variety, it is highly important that volume be steady and approach the normal capacity of the system."[56]

WHERE TO STORE CRUDE

Before and after each transport stage materials have to be stored; indeed, storage is but a phase of the transport function.

Storage of huge quantities of crude surging from a newly-struck gusher is a difficult problem. Most of us still remember oil running to waste on such an occasion, and the big open reservoirs consisting of earthen walls from which so much was lost by seepage and evaporation. In developed fields, however, such a sudden uprush of oil could be taken care of by a network of permanent installations, and those who controlled them were called upon to

iron out fluctuations by adding to their stocks or by releasing them. It was Deterding who laid stress upon the importance of having "an enormously long purse to be able to snap your fingers at everybody," and he went on to say "if people do not want to buy it to-day, I say to them, 'All right; I will spend a million sterling in making reservoirs.' "[57] At a later stage it was realized that the most appropriate place for storing crude was the subsoil: the "conservation" idea is based on the conception that oil should be withdrawn at a controlled rate, and could best be left where it was against the day when it was actually required. Such a procedure, however, hinges on unified control of a field (for some more details of what this involves, see the chapter on "Crude Production"); oil can be stored underground only if it belongs to a "Common Pool". That, to meet difficulties, one can go one step further still in such a "storage policy", is demonstrated by Anglo-Iranian's practice of pumping unwanted fractions back into the wells rather than wasting them or putting up cumbrous storage tanks.

See anywhere how crude oil is stored and you will see the constitution of that phase of the industry; here, as at all subsequent stages, the way storage problems are solved indicates the prevailing state of affairs.

SHORE INSTALLATIONS

In areas contiguous to oilfields the problem of storing large quantities at the user end does not arise, since supply can be effected by a series of consecutive deliveries in rail or road tank wagons or continuously by pipeline. Where, on the other hand, long-distance transport necessitates shipment by river, coastal or deep-sea tanker, the problem arises of how to accommodate the oil prior to loading and after unloading. The obvious shortcomings of its most primitive solution—that of filling from and unloading into rail cars, not to mention the use of drums at either end, which has been tried from time to time—prove the inescapable necessity of being able to use permanent shore or river-side installations.[58]

The specialized character of equipment suitable for handling liquids has not usually attracted people who concentrate on transportation of miscellaneous goods, and the oil industry has had to run the whole show itself. When and where this happened business came to be controlled by those who could muster a turnover sufficiently big and constant to justify and support the machinery and organization involved. Only at focal points of

trade and traffic was it feasible to develop "neutral" storage installations, on public wharfinger lines, catering for a considerable number of individual traders, big and small.

Before the war the Scandinavian countries and Finland provided an excellent example of the former type: the almost complete control of these markets by Major Companies was mainly due to the fact that they, and they alone, controlled bulk shore installations capable of holding full cargoes. The geographical position of these countries—with the exception of a part of Denmark—precluded supply by rail, and less wealthy independent interests were hampered by a vicious circle: they could not acquire a clientele whose requirements would have been sufficient to vindicate investment in shore installations without first providing the installations.

That it is, however, impossible to regulate a very big market by controlling storage facilities has been proved by American experience, and in England by the history of Thames Haven Oil Wharves and their paramount importance for the British oil trade.

MARKET "UNITS"

Storage facilities have also played a vital role in a quite different sphere of oil marketing, in what the Americans call "retail outlets." Few features are of greater importance for the structure of a market than its "units"; the smaller they are the more diversified will the market be.

In the early days of the oil trade the "unit" was the barrel, since actual delivery to the retailers was made in casks. Whoever had sufficient turnover to sell the contents of a barrel within a reasonable time could, subject to certain fire prevention regulations, enter the field as a retail outlet.

Long before the motor car era, however, the first steps had been taken to devise storage and delivery methods which made proper allowance for the fact that it was a liquid that was to be marketed. It has often been said that Standard Oil owed their paramount success to their exploiting the advantages of being able to use pipe-lines for long-distance transport of crude oil, but the consequences of another development, on a more modest scale, have not generally been appreciated. Apart from their refining advantages, Standard owed their leading position in the kerosine market to their method of supplying the finished products to the customer. They appear to have been the first—not only in the States[59] but in most European countries—to devise a method

of storing kerosine immediately prior to its sale to the consumer. They provided shops with a little tank from which the retailer could draw the required quantity at the time of sale, and they replenished the stock in the tank from horse-drawn road tank wagons. The retailer was never faced with the necessity of handling packages, he was only concerned with the liquid itself. Such an arrangement offered considerable advantages, and retailers were easily persuaded to sign an agreement to the effect that they would not sell any kerosine except that supplied by the company providing the tank.

Once again it can be seen that success of commercial and industrial policies mainly depends upon their initiators making use of certain natural factors, upon their harnessing the tides. It was the result of a shrewd and correct appraisal of a technical problem by Rockefeller, and one of the factors of complete and lasting success, that Standard Oil carried the liquid in bulk and deposited it in semi-permanent containers at the retail end rather than shifting to and fro smallish containers which are difficult to handle on the spot, and thus are not satisfactory as storage receptacles.

S. A. Swensrud, a Standard Oil man of our days, has drawn our attention to the significant fact

> "that the final purchase (of gasoline) is typically extremely small, while there is a great advantage from a cost standpoint in moving the product in large quantities. The conflict between demand in extremely small quantities and transportation in very large quantities has necessarily led to a series of storage facilities—ocean terminals, barge terminals, bulk plants, and filling stations—so that large-quantity movement can be carried as far towards the final consumer as possible."[60]

These are facts of the greatest theoretical significance: *the liquid state of petroleum entails the tendency to develop "units" of a higher order.* As soon as a certain turnover is reached the barrel system becomes outclassed by *a complex organization whose unit is not*, as one would perhaps be inclined to assume, *the individual retail storage tank, but the whole machinery of bulk terminals and road tank wagons without which it could not function.*[61]

The most recent example of transport and storage arrangements being the controlling factor on the marketing side is the scramble for outlets connected with airports. It is obvious that the marketing "unit" of aviation engine fuel will be a big one, and this prevents competition below a certain size getting anywhere near it. Aviation as a large-scale consumer is a godsend to the oil giants, unless storage and distribution catering for it should be

put on a "Common Carrier" basis. Already "it has been repeatedly rumoured that many of the major oil companies intend to operate coast-to-coast airport chains to increase the sale of petroleum products".[62]

LINKS IN THE CHAIN

The fact that oilmen have always had to look after transport functions themselves has given a fillip to vertical integration. That the producer has to deliver the crude to the refiner, or that the latter has to fetch it from the fields, helps to break down the dividing line between these two phases of the industry, and the same holds good in respect of refining and marketing.

The importance of transport is still further increased by the fact that oil has to be transported *twice:* from the well to the refinery, from the refinery to the consumer. This applies to many industries, but here it has a peculiar implication because the volume of the material to be shifted is about the same in either case. Iron ore plus coke are much bulkier than steel, the volume and weight of aluminium is only a fraction of that of bauxite. Thus transport matters less for the finished article. But a modern oil refinery turns out almost as much in products as it takes in in the form of crude.[63]

THE "EMPTIES"

One of the greatest snags encountered in transporting a liquid is the need for returning containers empty before they can be used again. This is one more consequence of the self-contained character of the transport of a liquid. Most other vehicles can be used for some other job at or near the place where they are discharged. With the exception of traffic radiating from some sources of raw materials, means of conveyance can be used both ways—the traditional balance of shipments of coal from the United Kingdom to South America and of grain from the River Plate to Britain is the classical example. The charges for long-distance passenger traffic are based on similar assumptions, and taxicab fares in urban areas would have to be much higher were the drivers not allowed to pick up passengers *en route.*

The cost of the return of empties—of barrels and drums, road and rail tank wagons, river barges, and deep-sea tankers[64]—is considerable, much bigger than is usually realized. The nominal fees railways charge for this service do not cover the cost involved, but it cannot fail to be taken into consideration when the rates for the trip with a "payload" are worked out.

A PERFECT CARRIER

Pipe-lines are the only means of transport of a liquid or a gas not involving the return of the empty container or its elimination after one trip. Nothing but the material itself is moved, the pipes which "contain" it are themselves stationary and thus allow of continuous operation.

The pipe-line, given a certain set of conditions, is the perfect carrier of liquids, and also one of the most ancient. We know of bamboo pipe-lines in the Cathay of Marco Polo's times, and we need only look at the number of aqueducts built by the Romans to realize how great and how obvious the advantages of piping water must have been ever since the art of engineering advanced to the construction of such lines.

In searching for the fundamental reason for the superiority of a line of pipes over a number of containers, we find that, by filling the liquid into a barrel or a tank wagon, which after all is nothing but an outsize drum, we solve the transport problem by putting a protective skin round the liquid and by actually carrying a solid, i.e. the container. At the stages of filling and emptying we take the liquid character of the "fare" into account, but not at the stage of actual transport.

In the case of a pipe-line, however, we do not eschew the fact that our material is a liquid; on the contrary, we take advantage of its capacity of flowing and of offering comparatively little resistance to changes of form. *Indeed, the essential difference between pipe-lines and all other means of transport is that by the latter the oil can be carried from one place to the other* in spite of *its being a liquid, in the pipe-line* because *it is one.*

WHERE PIPELINES SCORE

The method of supplying water by pipes over a distance, as compared with the otherwise inevitable carrying of small quantities from a great number of scattered wells, is actually the prototype of our oil pipe-line system, and we recognize certain basic facts in both of them. Conveyance by pipes makes sense only if three conditions obtain:—

(1) Substantial supply concentrated at certain points.
(2) Concentrated demand—e.g. an agglomeration of urban population.
(3) Supply and demand of reasonably stable character so as to justify investment in a permanent link between the

two. In fact, if we consider the barrel as 1 and the road tank wagon as, say, 100, the order of the pipe-line is ∞.

The Romans built aqueducts for towns reasonably near a mountain range, where there was plenty of water of higher purity than that available from local sources. In the case of petroleum, pipe-lines come into their own as soon as the quantities involved surpass a certain minimum.[65] Concentration of demand is brought about by crude being available only in certain "fields", and also by the fact that it is not consumed as such. It cannot be delivered from a series of wells direct to a number of customers; it has to go through a refinery which, to be efficient, must be of considerable capacity compared with the output of one or even several wells.

The case for pipe-lines was once summed up by J. E. Pogue as follows:—

> "For liquids available in large volume the pipe line affords the most efficient form of overland transportation. The capital cost is relatively low, for pipes are laid rapidly by means of mechanical ditchers and suffer a very slow rate of physical deterioration. Rights of way are not expensive,[66] cities may be avoided and expensive terminal facilities are unnecessary. Operating costs are likewise small per unit of commodity moved; because the working of the system is automatic to a considerable degree, the movement is continuous, maintenance is relatively inexpensive, and there is no problem of two-way traffic or return movement of empty facilities. In consequence of these advantages, the average cost of pipe-line transportation probably does not exceed four-tenths of a cent per ton-mile, which contrasts with an average cost for moving railroad weight of approximately three-quarters of a cent per ton-mile. Thus no far-reaching competition can persist between oil pipe lines and the railroads, for the latter cannot match the low costs of pipe-line movement."[67]

AN INTEGRAL PART

We saw that the necessity of building and maintaining elaborate and specialized storage installations had an integrating and concentrating effect; the same applies to an even higher degree to pipe-lines. As pipe-line transportation is economically feasible only if there is a continuous flow on a considerable scale, discrimination is inevitable against those competitors whose turnover or financial resources do not allow them to build a pipe-line. This factor was fully realized in the United States by about 1910, when the status of a Common Carrier was imposed on company-run pipe-lines, and, in theory at least, trunk pipe-lines have been bound ever since to accept any oil tendered to them.

It has often been suggested that the law remained a dead letter because of bad faith shown by the "Major" companies controlling

the pipe-lines, but things are not quite as simple as all that.[68] This is how pipe-lines were described by M. W. Splawn, in his Report to Congress of 1933:—

> "Oil pipe lines are found to be plant facilities in an integrated industry. They are very different from railroads in that railroads are not limited to one product; petroleum is carried in one direction, from a diminishing source of supply. Pipe lines have been built primarily by oil companies."[69]

There can be little doubt that Mr. Splawn is right when he emphasized that a pipe-line cannot be treated as if it were a railway, and one has to accept his further comment that

> "if the oil companies were forced to sell the pipe-line companies, who would buy them, and who would build to newly discovered oil fields? It appears that, whatever regulation of oil pipe-lines may be necessary, it may be provided in recognition of the character of pipe-line transportation and its relation to the oil business."[70]

To "*divorce*" pipe-lines from the industry—an idea which has been on the agenda for some time—does not seem to be in keeping with the technique and the traditions of the pipe-line system. It would be more appropriate to acknowledge fully the deep *integration* of the oil transport system in the industry itself, and to use its controlling position for co-ordinating and adjusting developments within the industry as a whole. This problem will loom large when "policies for the industry" are discussed in the concluding chapter of this book.

NOTES AND REFERENCES

[1] Differences in calorific values of various fuels are not taken into account at this stage. The object of these pages is not to compare the practical value of given fuels, but to outline the significance of their respective constitutions. The fact that storage and transport of fuel oil differs from that of coal, and its capital importance for the fuelling of ships will be covered in Chapter 4 of Part III.

[2] I am aware of recent developments indicating certain potentialities of coal dust and colloidal fuels, but it is still too early to assess the degree of their usefulness on a really large scale.

[3] I first came across this statement on the difference between the steam and the internal combustion engine when perusing A. C. Hardy's *Oil Ships and Sea Transportation. A Story in Relation to the Effect on Sea Transportation.* London, 1931, pp. 14 *et seq.* The relevant passage reads as follows:—

> "Combustion, i.e. the generation of the necessary energy for moving pistons and turning cranks takes place in the engine itself. Strictly, perhaps, we should say the conversion of energy into useful work, in order to be in complete agreement with the physical law. Consider at the outset what a vast change this has effected, the elimination, as it were, at a sweep of a separate energy-converting unit, and the embodying of it in the energy user itself. The discovery and development of oil alone has made this possible."

As early as 1912 Lord Fisher wrote in one of his highly emotional memoranda: —

"It must be admitted that the burning of oil to raise steam is a roundabout way of getting power! The motor car and the aeroplane take little drops of oil and explode them in cylinders and get all the power required without being bothered with furnaces or boilers or steam engines, so we say to the marine engineer, 'Go and do thou likewise!'" (Lord Fisher, *Records*, London, New York, Toronto, 1919, p. 196.)

(4) "In bituminous coal the ratio of carbon : hydrogen is about 15 : 1, while in petroleum oil it is only 8 : 1." (J. G. King, "The Better Utilization of Coal for the Production of Oil and Petrol", *Journal of the Institute of Fuel*, London, Fol. XVII, No. 97, August, 1944.)

(5) Several processes by which coal is made to yield liquid hydrocarbons are well known, but there still remains the problem of the one additional stage as compared with naturally liquid hydrocarbons. When the British Chancellor of the Exchequer was asked in the House of Commons about the intentions of the Government as far as oil from coal was concerned, he replied:—

"I tell the hon. member that if he would like to set about organizing our industry with a view of producing from coal all the products we now import in the form of petrol, fuel oil, and kerosine, he will be setting a terrible task to the people of this country, a task which would bring them to something very near slavery."

(June 22nd, 1944, *Hansard*, Col. 407.) To substantiate this view with figures I quote a statement by the late W. S. Farish, President of Standard Oil Company (New Jersey), before the Sub-Committee of Committee of Mines and Mining, U.S. House of Representatives, July 15th, 1942, which contained the following table:—

"COMPARISON OF METHODS FOR MOTOR GASOLINE PRODUCTION

Process	Approx. Cost per Bbl. Motor Gasoline per day (a)	Approx. Tons Steel per Bbl. Motor Gasoline per day	Approx. Gasoline Cost, Cents	
			Direct Cost, including normal overhead, but excluding depreciation	Total Cost, including normal overhead and 10 per cent. depreciation
High-pressure coal hydrogenation	$12,800	14.1	15.9	22.6
Fischer, European design starting from coal ..	7,600	8.9	14.7	19.2
Fischer, European design starting from natural gas (b)	4,750	6.5	6.0	8.8
Modern high-pressure hydrogenation of petroleum	1,150	1.4	4.8	5.5
Modern Oil Refinery, $1.20 bbl. (c)	700	0.7	5.1	5.3
Modern Oil Refinery, $2/- bbl. (d)	700	0.7	8.3	8.5

(a) 1942 costs for complete plant including all utility supply and auxiliaries. (b) Natural gas at 5 cents per 1,000 cubic feet. (c) Crude at $1.20 per barrel. (d) Crude price at well."

(6) It is quite significant that it pays to extract the liquefiable parts of natural gases so as to obtain a liquid casinghead gasoline, which is to be

blended with similar material obtained by distillation of crude. This is one more instance of the overall advantages of liquid fuels.

[7] For comparative present-day costs of ordinary crude and shale oil, see Benjamin T. Brooks, "A New Phase of the Petroleum Industry", (*Chemical and Engineering News*, June 25th, 1943, No. 12, Volume 21), where the author states:—

> "Although the costs of the Scotch shale oil industry obviously cannot be assumed to be the same as for the American shale oil of the future, in 1936 the mining costs in Scotland were 5 to 6 shillings per ton and the crude shale oil cost 4.5 pence per gallon (British) or about $3.25 per barrel. Some recent estimates for richer, selected strata of American deposits give a lower probable cost. It should be remembered that a barrel of shale oil is worth considerably less than a barrel of average crude petroleum."

[8] *Petroleum-Industry Hearings Before the Temporary National Economic Committee*, A.P.I., New York, 1942, p. 13.

[9] Arnold and Kemnitzer assert that

> "of the 50,398 wildcat wells drilled (in the U.S.A.) up to January 1, 1929, approximately 47,939, or 95.1%, were dry holes, and 2,460, or 4.9%, opened new areas of commercial importance."

On this record the odds are 19 to 1 against the "wild-catter" bringing in oil, as quoted in *Oil: Stabilization or Conservation*, by Myron W. Watkins, New York and London, 1937, p. 36.

[10] "The production of oil is a highly speculative enterprise in which only a fortunate few made large profits. The high price of success constantly attracts new wild-catters, the majority of whom, together with the unsuccessful producers, lose more money than the successful oilmen make. The public is willing to risk large sums on the long chance for huge profits." (Campbell Osborn, *Oil Economics*, New York and London, 1932, p. 108.)

People would plunge into the adventure even if the investors knew for certain that the total return from all borings would be less than their aggregate investment—it is the chance of hitting a treasure trove which governs their actions. If these motives were not a part of human nature, sweepstakes and lotteries in which the total of prizes unavoidably amounts to much less than the total of monies paid in would be impossible.

[11] Lionel Robbins, *Economic Planning and International Order*, London, 1937, p. 139.

[12] The following data, compiled by Bates and Lasky, have been widely quoted (among others by J. E. Pogue, on p. 30 of his *The Economics of Petroleum*). They are more than twenty years old, and may be out of date now, as they do not take secondary recovery into account. Any investigation of cost ought to be spread over the whole life of a well—the lifting costs are very high in proportion to production at the latest stage when the well has become a "stripper," sometimes yielding as little as a barrel a day.

> "Analysis of operating costs in 19 fields of a representative producing company in the Mid-Continent field:—

Direct lifting expense	22.50 per cent.
Depletion of property	18.50 ,, ,,
Depreciation of physical equipment	15.60 ,, ,,
Non-tangible development expense	14.55 ,, ,,
Dry holes and abandonments	13.20 ,, ,,
General expense	6.40 ,, ,,
Year's proportion of bonus	5.13 ,, ,,
Rentals and undeveloped acreage	4.12 ,, ,,
Total	100.00 per cent."

[13] "The three distinguishing characteristics of crude petroleum are its exhaustibility, its concealment and its fugacity, that is, its fugitive character arising from its fluidity" (*op. cit.*, p. 29).

[14] This does not apply as far as certain "newer" parts of the U.S. are concerned, where sub-soil rights are vested in the Government.

[15] In "Prudent Investment in the Petroleum Industry" (*A.I.M.M.E. Annual Meeting Paper*, February 24th, 1944) J. D. Gill says that

> "in the early stages of the development of the petroleum industry, waste is a natural accompaniment of prudent investment. It would have been just as difficult to produce much needed crude oil without waste of gas as it would have been for Shylock to have taken the pound of flesh without blood."

[16] The customary royalty in the U.S. is one-eighth of "that produced and saved". It is of about the same order in several other countries. The fact that a considerable part of the revenue goes to a sleeping partner makes the task of the entrepreneur still more onerous, although he is safeguarded by the fact that the major part of his payment depends on his success and on the price of his product.

[17] Samuel B. Pettengil, *Hot Oil: The Problem of Petroleum*, New York, 1936, p. 72.

[18] "Hurried exploitation of an oil field resulted in a physical waste of the oil reserve. In most of the oil fields of the country the oil is brought to the surface by the reservoir energy. Unless steps are taken to preserve this energy, it may be used up before the entire oil pool is drained. In the underground reservoirs a considerable amount of gas is under pressure in the petroleum and constitutes an important part of the reservoir energy. Unless steps are taken to prevent it, this gas tends to come out of solution and flow from the oil well. With the hurried exploitation of oil fields under the unrestricted influence of the rule of capture, the premature escape of gas resulted in leaving in the reservoir much inert petroleum incapable of rising to the surface without artificial aid. This loss of gas was characteristic of the early period of operation of an open-flow well or gusher. The loss of gas affected not only the natural lifting power of the oil, but also its ability to move through the sands from its original location to the bottom of the well." (*Investigation of Concentration of Economic Power*, Temporary National Economic Committee, Monograph No. 39–A, p. 18.)

[19] *Petroleum-Industry Hearings Before the T.N.E.C.*, p. 63.

[20] There is a vast literature on this subject to which I cannot refer in detail here. *Petroleum-Industry Hearings Before the T.N.E.C.* contains much useful information in an easily digested form, whereas the most cogent résumé can be found in *Progress Report on Standards of Allocation of Oil Production Within Pools and Among Pools*, by the Special Study Committee and Legal Advisory Committee on Well Spacing and Allocation of Production of the Central Committee on Drilling and Production Practice, Division of Production (A.P.I.), Dallas, Texas, 1942. There exists, however, a school of thought which denies the drawbacks of drilling a great number of wells, and which challenges the basic idea of proration. (See William J. Kemnitzer, *Rebirth of Monopoly: A Critical Analysis of Economic Conduct in the Petroleum Industry of the U.S.*, New York and London, 1938, p. 109; and Stuart K. Clark, J. S. Royd and C. W. Tomlinson, *Well Spacing—Its Effects on Recoveries and Profits*. Bulletin of the American Association of Petroleum Geologists, 1944 (*Oil and Gas Journal*, February 17th, 1944, p. 75).

[21] See Dorsey Hager, *Fundamentals of the Petroleum Industry*, New York and London, 1939, p. 95, for the following definition of the term "Unitization":—

"The term unitization refers to the practice of unifying the ownership and control of an actual or prospective oil or gas pool by the issuance or assignment of units, or undivided interests in the entire area, with provision for development and operation by an agent, trustee or committee representing all holders of undivided interests therein. (From 'Unitization' by Mid-Continent Oil Gas Association.)"

[22] One of the possible causes of inadequate supply is the necessity of being sure of a market before large amounts are invested in a plant which can only be run economically at full capacity.

[23] P.E.P. (Political and Economic Planning) Industries Group, *Report on the British Cotton Industry*, London, June, 1934.

[24] *Report on the British Cotton Industry*, p. 79.

[25] *Report on the British Cotton Industry*, p. 96.

[26] Power for running textile machines is now usually not generated at the works, but supplied by public utility undertakings. It is therefore easier to increase or decrease the number of machines working than if the size of the works' power plant had a certain degree of influence upon the economical level of production.

[27] I am aware of some recent developments in the textile industry which have shifted the accent from manpower to plant performance. The 1944 British Textile Mission to the U.S.A. has thrown light upon the difference prevailing in this respect. I was particularly struck by the amazement of some English textile men when they were confronted with the problem of running three eight-hour shifts so as to utilize expensive machinery. Such a trend would obviously incline to reduce the traditional difference between the textile and the petroleum industry.

[28] Robert W. Dron, *The Economics of Coal Mining*, London, 1928, p. 9. This estimate refers to the British coal industry; conditions on the Continent of Europe, however, do not seem to have been different—the estimate in André Dubosq's *Le Conflit Contemporain des Houillères Européennes. Perspectives d'Entente*, Paris, 1936, p. 15, tallies fairly well with the one for Great Britain.

[29] J. Harry Jones, G. Cartwright and P. H. Guénault, *The Coal Mining Industry*, London, 1939, p. 71, and *U.S. Bureau of Mines* (John W. Finch, Director), *Bulletin 414*. George S. Rice and Irving Hartmann, "Coal Mining in Europe", Washington, 1939, p. 332.

[30] *Statistical Digest*. Presented by the Minister of Fuel and Power (July, 1944. Cmd. 6538, p. 51). It is perhaps worth realizing that, according to the same source, war-time increases had by 1943 pushed up the value of wages to 75 per cent. of "total net cost".

[31] George Rice and Irving Hartmann, *op cit.*, p. 338; and *The World Coal-Mining Industry*, Vol. I, "Economic Conditions"; I.L.O. Studies and Reports, Series B (Economic Conditions), No. 31 (Geneva, 1938, pp. 209 *et seq.*).

[32] Arthur Fletcher Lucas, *Industrial Reconstruction and the Control of Competition: The British Experiments*, London, New York and Toronto, 1937, p. 76 and p. 89.

[33] See George Rice and Irving Hartmann, op. cit., pp. 69 *et seq.* More figures in P.E.P. (Political and Economic Planning) Industries Group. *Report on the British Coal Industry*, London, February, 1936, p. 23.

[34] George Rice and Irving Hartmann, *op. cit.*, pp. 69 *et seq.*

[35] George Rice and Irving Hartmann, *op. cit.*, p. 60.

[36] This is characteristic not only of the British but also of the U.S.A. coal industry. See "Investigation of Concentration of Economic Power", Monograph No. 21. Clair Wilcox, *Competition and Monopoly in American Industry*, where on p. 25 F. G. Tryon is quoted as having said:—

"Bituminous coal offers the example par excellence of extreme competition among thousands of separate units."

[37] The German coal industry—and the French to a certain extent—were an exception in that respect, the main reasons being their concentration in small areas and their most intimate contact with iron and steel interests.

[38] T. H. Burnham and G. O. Hoskins, *Iron and Steel in Britain, 1870–1930*, London, 1943, p. 139. According to other figures quoted on p. 333 of the same work relation of labour and "other" cost was as high as 3 : 1.

[39] An instructive outline of the problems involved is to be found in D. L. Burn, *The Economic History of Steelmaking, 1867–1939. A Study in Competition*, Cambridge, 1940, especially on pp. 96 *et seq.*, pp. 521 *et seq.*, and pp. 526 *et seq.*

[40] London, New York, Toronto, 1933.

[41] G. C. Allen, *British Industries and Their Organization*, London, New York, Toronto, 1933, pp. 14 *et seq.*

[42] One particular aspect of the build-up of the price of rubber will be referred to in Part III, Note 3, where the respective structures of oil and rubber prices will be compared. For an outline of cost connected with the production of plantation rubber see P. T. Bauer, "Rubber Production Costs During the Great Depression", in *The Economic Journal*, the quarterly of the Royal Economic Society, No. 212, December, 1943, Vol. LIII, pp. 361 *et seq.*

[43] K. E. Knorr, "Rubber After the War" (II), in *India Rubber World*, August, 1943, p. 465.

[44] K. E. Knorr, "Rubber After the War" (IV), in *India Rubber World*, October, 1943, p. 49.

[45] *Petroleum-Industry Hearings Before the Temporary National Economic Committee*, 1942, A.P.I., New York, p. 343 (Statement of Robert E. Wilson, October 5th, 1939). According to "Investigation of Concentration of Economic Power," T.N.E.C. Monograph, No. 39 (*Control of the Petroleum Industry by Major Oil Companies*), Washington, 1941, however, refining employs 13 per cent. of those working in all phases of the petroleum industry, and its share in invested capital is 27 per cent.

[46] *Elements of the Petroleum Industry*, edited by E. DeGolyer, New York, 1940. Joseph E. Pogue, "Economics of the Petroleum Industry," p. 496. It should, however, be noted that other authors, e.g. J. D. Gill in "Prudent Investment of the Petroleum Industry," A.I.M.M.E. *Annual Meeting Paper*, February 24th, 1944, give only $16,200 as "net capital invested per employee, 1940".

[47] Dorsey Hager, *op. cit.*, contains on p. 58 the following instructive table based on Bureau of Labour figures for June, 1937:—

"BUREAU OF LABOUR FIGURES FOR JUNE, 1937

Industry	Hourly Earnings. Cents	Hours per Week
Petroleum Refining	95.2	36.5
Crude Production	82.8	40
All Manufacturing Industries	65.3	39.2
Iron and Steel	76.0	40.2
Rubber	78.8	35.7
Textile	50.2	35.1

The difference between the textile and petroleum refining industries is most significant in the light of what was said earlier in this chapter of the respective structures of the two industries.

The role of labour in a refinery has been aptly summed up by M. W. Watkins, *op. cit.*, p. 20:—

> "Labour is relatively a minor factor in the refining branch of the industry. The major operations are controlled by the reading of gauges and the manipulation of valves. Aside from the few highly skilled technicians to supervize the necessarily precise and well-timed adjustment of the mechanical equipment the principal demand for labour is for cleaning and repairing, services which are required at rather frequent intervals in most departments of a refinery. Nevertheless, the total amount of labour required per value unit of output is extremely small—smaller, indeed, than in any other major manufacturing industry, with the single exception of printing and publishing."

(48) E. A. G. Robinson, *The Structure of Competitive Industry*, London and Cambridge, 1937 (Cambridge Economic Handbooks—VII. General Editor: D. H. Robertson), p. 94.

(49) Most operatives in a refinery are specialists steeped in the technicalities of their jobs and difficult to replace. A refiner will much rather hang on to them than try to save their wages in a shut-down period. They are, in fact, an integral part of the plant. They have attained the rank of an "overhead" whereas the miner is still "expendable."

(50) This is illustrated by a report in *Oil and Gas Journal*, of October 21st, 1944 (R. B. Tuttle and Arch L. Foster, "Associated Refinery Draws Charge Stocks from Eight Different Refineries"), which runs as follows:—

> "One of the major problems of refiners of small and medium capacity, at the outbreak of the war, was that of working out some method by which they might contribute to the supply of aviation and general-purpose fuels and other petroleum products required in such huge quantities. It was realized that successful operation of catalytic cracking, alkylation and other indispensable processes require at least a minimum crude throughput to warrant construction of the necessary equipment. A number of Mid-Continent refiners, considering that a mutual interest in the subject could be served best by co-operative effort, united to form Associated Refineries, Inc., of Duncan, Okla."

(51) Albert Coppé, *Problèmes d'économie charbonnière. Essai d'orientation economique*, Bruges, 1939 (Université de Louvains. Collection de l'école des sciences commercielles economiques), p. 194.

(52) *The British Gas Industry*, An Economic Study, by Philip Chantler. Manchester, 1938, p. 66.

(53) G. Lloyd Wilson, James M. Herring, Roland B. Eutsler, *Public Utility Industries*, New York and London, 1936, p. 20.

(54) Transport is "accidental" to these industries, even if it represents a high proportion of total cost, as long as it remains on the fringe of their main activities and is devised and performed by outside elements.

(55) Transport costs are a big item in the price build-up of many *raw materials*, but there are very few *finished products* whose prices contain such a high percentage of transport costs as does motor spirit. Some tentative calculations will be found in Appendix I on pp. 153 *et seq.*

(56) R. B. Shuman, *The Petroleum Industry*, Oklahoma, 1940, p. 95.

(57) Lord Fisher, *Records*, London, New York, Toronto, 1919, p. 202.

(58) Delivery of engine fuel to the fighting forces during the war has shown an identical development, ranging from all-the-way supply in "Blitz Cans" to the fully streamlined storage and pipe-line systems established after the Normandy invasion, in which only the last stage was left to "Jerry Cans." In the campaigns of 1945 bulk delivery down to the ultimate "consumer" became customary.

(59) According to Nevins, *John D. Rockefeller. The Heroic Age of American*

Enterprise, Vol. I, p. 661, Standard Oil made the first experiments in wagon delivery of kerosine in the 1880's. In Europe the same system was adopted, and it is very characteristic that the hold of the Standard Oil in the lamp-oil business is to this day stronger than it ever was in the motor spirit field.

(60) *Petroleum-Industry Hearings Before the Temporary National Economic Committee*, New York, 1942, p. 394.

(61) The problems of adequate machinery for retail distribution of liquid petroleum products have been outlined by three Standard Oil (New Jersey) experts—R. T. Haslam, F. M. Surface and J. R. Riddell—in "Petroleum Marketing, Cost and Cost Reduction" (*National Petroleum News*, March 3rd, 1943, pp. 28 *et seq.*; March 10th, 1943, pp. 32 *et seq.*; and March 17th, 1943, pp. 27 *et seq.*). See also my article on "The Role of Tank Waggons," in *Petroleum*, September, 1944, VII., 9, pp. 159 *et seq.* There I referred to the great importance which the rail tank car, as the "unit" of business had for a long time until the advent of the road tank wagon, which provided a direct and more flexible connection between refineries and retail outlets.

(62) *National Petroleum News*, December 27th, 1944, p. 43. The same despatch contained a report on the bids submitted by several Major Companies for the development and management of Westchester Airport. Should the oil firms decide to run the whole show for the sake of securing airports as exclusive sales outlets, the marketing "unit" of aviation spirit would become very large indeed. I have, incidentally, never seen a reference to the striking similarity—at least as far as the marketing end is concerned—of motor spirit and beer. Beer, biggest seller of all liquids after petrol and milk, is in Britain marketed through public houses, most of whose special equipment is leased by the breweries. In the course of time, however, to safeguard the market for their own brand, or sometimes to insure their credits, the brewers have practically taken over the management of the outlets.

(63) These facts have caused the most efficient refineries to be built as near as possible to consuming centres, even if this involved a long haul from the oilfields. It was easier to make use of adequate transport methods for one product—crude—moved in quantities as big as all the several finished products together. Incidentally, the traditional drawbacks of refineries located away from the fields, refining loss and low value of fuel oil, are being gradually eliminated by technical progress.

(64) For a survey of the economics of tanker shipments, see Appendix II on pp. 157 *et seq.*

(65) The first pipe line for crude was planned and built within six years of the day Drake struck oil in Oil Creek, and only four years after the first experiments with carrying oil in bulk river barges were made. The trials and tribulations of the first man to try the new-fangled idea was vividly described by Paul H. Giddens in *The Birth of the Oil Industry*, New York, 1938, p. 142 *et seq.*:—

> "Early in 1864, a scheme for laying a pipe down the Allegheny to Pittsburg was proposed, but a large number of the people in the oil region opposed it, for fear it would drive out the teamsters and ruin business, so the project was abandoned. These early experiments demonstrated the practicability of the pipe line, but its successful operation over greater distances did not come until the summer of 1865.
>
> "The unsatisfactory conditions of the roads, the exorbitant charges of the teamsters, and the production of oil faster than it could be hauled away from Pithole influenced Samuel Van Syckel, an oil buyer, to lay a 2-inch pipe line from Pithole to Miller's Farm on the Oil Creek Railroad, about 5 miles away. From the moment that Van Syckel got the idea until he completed the project and demonstrated its usefulness, he was the subject of ridicule. Many people believed it to be a visionary

scheme, and had little confidence in its success. When he talked about it, his friends pitied him; they did all they could to discourage him, told him that it was a folly to attempt such a thing, that it could not be done, and that it would cost a mint of money. Van Syckel admitted that it might cost $100,000; but he had the money and believed in the idea. Others, not his friends, made him the butt of their ill-natured jokes. They would sarcastically inquire 'Do you intend to put a girdle around the world?' 'Can you make water run uphill?' Finally he had to take his meals privately at the Morey Hotel, as he was unable to endure the scoffings and revilings that greeted him in the public dining hall; and, to avoid the loafers in the front room of the hotel, he would go out and in by the back door."

(66) This statement of Pogue's applies to the U.S.A., but conditions in some other countries, like the United Kingdom, are different, and there the legal set-up will have to be revised if trunk pipe-lines are to be a commercial proposition.

(67) Joseph E. Pogue, *Economics of Pipe-Line Transportation in the Petroleum Industry*, New York, 1932, p. 12.

(68) It would be wrong to assume that the very small quantities actually carried for others by company-controlled pipe-lines were the measure of the regulations' effectiveness; the very fact that an independent, if he actually wanted to, *could* have his oil carried, made it imperative for the Majors to buy and to sell crude at the two ends of the pipe-line at prices allowing fairly accurately for the rates shown in their official pipe-line tariffs. Thus, very often, it was not worth the trouble that it caused the independent refiner to buy his crude at source and pay for its carriage, and he would much rather buy it at his end of the pipe-line at an all-in price.

(69) *Report on Pipe Lines in Two Parts*, 72nd Congress, 2nd Session, House Report, No. 2192, Washington, 1933, Part I, p. 78.

The term "plant facility" has been elucidated by F. B. Dow in his statement before the T.N.E.C. in 1939:—

> "The pipe line is conceived as a facility to bring oil to the plant so they have come to speak of it as a 'plant facility'. It is not altogether an apt phrase. It seems like stretching things to call a 500-mile pipe line a facility of a plant. It is more than an arm, with a hand and gathering fingers, reaching out for some material needed by the body. But, however undescriptive the phrase 'plant facility' may be, the purpose of the crude-oil pipe line as a means of securing a crude-oil supply is primary and fundamental; the fact that it is a facility functioning as a carrier is a secondary consideration." (*Petroleum-Industry Hearings Before the T.N.E.C.*, New York, 1942, p. 320.)

(70) *Report on Pipe Lines in Two Parts*, p. 78.

PART III

PRICE STRUCTURE

Chapter 1

THE INFLUENCE OF DEMAND ON PRICE

THE price of a commodity depends, as far as demand is concerned, on what the buyer can do with it and whether he can do without it. The supplier, on the other hand, must consider the cost of production and alternative uses for raw materials and for capital and labour employed. Variations in any of these elements which determine the market price will affect *all* the others, and whether they will go a long way or be checked at an early stage is dependent on the "response", as it were, with which they meet.

What does, in fact, go to make up the price of petroleum, and how are its fluctuations to be explained? The price of motor spirit, to take the premier product first, is, as far as demand is concerned, determined chiefly by the service it renders in the engine, and by the relative importance of road transport in a given area as opposed to competing means of conveyance—such as railways; another factor is technical suitability and availability of alternative fuels—for instance, diesel oil and synthetic products—for internal combustion engines.

ELASTICITY OF DEMAND

The best way to understand the mechanism of pricing is to find out what happens if a commodity becomes dearer or cheaper than it was before. According to the text-books, the opportunities for selling a commodity increase if the price goes down, because it comes within the range of buyers who could not afford or would not buy it at the previous price level, and in some cases those who bought it before will increase their purchases if more of the commodity is to be had for the same amount of money. The opposite happens in the case of a price increase—*the higher the price the narrower the market.* Economists have suggested that

price movements are to a great extent self-regulating: an increase in price, due to demand exceeding supply, leads to a reduction of sales which will, in due course, restore the balance of supply and demand; a decrease in the price of a commodity will boost its sales and the "surplus" supply which may have caused the previous price level to give way will readily be taken up by an expanding market.

The tendency to react in such a manner to price fluctuations has been called "elasticity," and the more elastic a market is the less will be its price fluctuations.[1]

Natural silk is a characteristic example of a commodity with a highly elastic price structure. At a fancy price it was for hundreds of years available only to the wealthiest; even when large quantities became available, during the last century or so, its price only came down very gradually—never did the bottom fall out of the market. This was due to the fact that each of the subsequent reductions of price, *however small*, opened up vast new sales opportunities among people who had always been willing, but were only now able to avail themselves of an article of the inherent excellence of silk. There is still another interesting aspect of the economics of silk. When two or three commodities answer very much the same purpose as do cotton, silk, and rayon—or butter and margarine—then any substantial rise or fall in the price of one of them does lead to a palpable increase or decrease in the sales of the others. If such propinquity acts as a check on price increases, since the penalty of a sharply reduced turnover is a potential danger all the time, it also obviates inordinate price slumps. Should the price of one of these commodities begin to fall while another stays put, the former's market expands rapidly and the downward price curve is quickly flattened out.

MOTOR SPIRIT DEMAND NOT PRICE ELASTIC

Neither of these automatic checks appears to exist in the case of petrol. Its price can, within reason, be increased without anything like a commensurable drop in sales and, on the other hand, even the most radical reduction of price will fail to make markets expand proportionately unless it is accompanied by other developments which have nothing to do with petrol.

In fact, motor spirit is a perfect example—as, indeed, to an even greater degree is lubricating oil—of an "auxiliary" commodity: they are used so that other goods can be put to use.

The running of a private car involves fixed and variable costs.

The former includes the price of the car, more often than not represented by instalments in a hire-purchase scheme, the cost of a garage, and, in some cases, of a chauffeur. In many countries must be added the annual licence fee—often on the high side—and also the cost of insurance. Compared with these heavy expenses which accrue independent of the mileage of the vehicle, the variable costs—mainly engine fuel, lubricants, and tyres—are relatively small.[2] Once a man has bought a car and has paid all the expenses that go with ownership it does not make sense to cut down its use, for only by using it well and truly can he justify all the expenditure he has incurred so far. This does not imply that the price of fuel has no influence whatever on the amount used. Clearly, it will matter a lot if the price of fuel varies from 1s. 6d. to 10s. a gallon, but, over a period, it will make little difference whether it is 1s. 2d. or 1s. 7d., although, in fact, such an increase is no less than one-third of the lower price and, incidentally, exceeds the current value of the material at the refinery.[3]

LUBRICANTS: LESS ELASTIC STILL

This feature is still more recognizable in the market for lubricating oil, and its very peculiar character is due to the great value of the lubricated engine or plant compared with the trifling cost of even the most expensive oil. In the motor spirit market, where it is somewhat difficult to make a serious case for preferring any particular brand or type on the grounds of its superior quality, price is to a great extent determined by competition, whose nature will be described presently, but lubricants are for very good reasons less competitive.

The nature of lubrication was little understood for a long time, and the relative merits of individual oils were difficult to assess. This unscientific approach to lubrication led to the vague idea, seldom based on anything more than superstition, that some oils had a certain something the others hadn't got.[4] So the lube oil market became a happy hunting ground for those who knew how to exploit the anxiety of a user who, when choosing the oil for his engine or machinery, had constantly to bear in mind that a considerable investment was at stake. In this way certain manufacturers—who mostly, it is true, had a suitable oil to sell—built up a reputation which enabled them *to appropriate a substantial part of the big difference between what a good oil costs to make and the remarkable damage a bad oil can cause.*

Indeed, the prices of some of the more famous brands of engine,

turbine or transformer oils contain elements which are in the nature of a witch doctor's fees, combined with some sort of insurance premium, and cannot be considered purely as rewards for the supply of goods. This description of the lube oil set-up is not intended to suggest that the makers of branded oils were or are making unjustified or extortionate profits, but the colossal margin between production cost and the price which can be obtained for a trusted oil has led to marketing methods of almost unparalleled extravagance.[5] Advertising, high commissions to distributors, fancy sales' aids, and comprehensive service systems —to say nothing of downright bribery—swallow up a great part of the money the consumer pays. All this, however much it may blur the picture, does not affect the underlying fact that, once the strictly competitive character of an "auxiliary" commodity is removed, monopolistic prices can easily be maintained at practically any level.

TAX GATHERER'S PARADISE

To return to motor spirit: here the tax collector assumes the role of those who, in the sphere of lubricants, took advantage of their opportunities. The world market price for gasoline has shown a downward trend, only occasionally interrupted by short periods of rising prices, ever since the days of temporary shortage after the last war, but the consumer has not benefited by this development, because heavy and sometimes outrageous taxes have been superimposed upon the price of the actual commodity.[6] Throughout the whole period, however, consumption of motor spirit went up and up, a trend interrupted only during the depression in the early 'thirties, and then, obviously, for reasons not connected with petroleum, but as a result of the general fall in the standard of living and change in all industrial activities. Gasoline taxes have been such a success everywhere, because they answer all the requirements of efficient indirect taxation. Owing to the widespread use of the commodity it yields a magnificent return, and it does not kill the goose that lays the golden eggs.

Other taxes, like those imposed on tobacco, spirits, or entertainment, are successful because a great part of the population regards these luxuries almost as necessities, and is prepared to sacrifice most other pleasures in order to be able to smoke, to drink, and to go to the cinema. Petrol is very nearly in the same category, except in so far as its low elasticity for a rise in price is paralleled by an equally low elasticity for a fall. What happens if

its price falls is due to the "auxiliary" character of petrol. If the price of beer or cigarettes were halved, it would probably result in an immediate and considerable increase in consumption, but this would not be the case with petrol. Would people who were already running a car be likely to double their mileage? The addition of new car owners, which really would make a difference in petrol sales, is governed, as we have seen, more by the cost of cars and other fixed expenses than by the price of motor fuel.

NO SERIOUS COMPETITORS

The second factor that is likely to limit variations in the prices of commodities, that is, the possibility of gaining ground from a competitive material by a decrease and the danger of seeing one's markets invaded by newcomers in the case of an increase, is, in the short run at least, almost non-existent for petroleum products. With the exception of kerosine in the early days and fuel oil, within certain limits, they have never taken over existing markets; they have created new markets of their own, and where they compete with other materials price is not the point at issue, but rather the strength of a superior performance by a given product. This feature, touched upon in its technical aspect (see above, pp. 13–15), re-appears at all stages; road transport, the principal outlet for petroleum products in spite of all other developments, does not score because it does a job cheaper than could some other form of transport, but because it does a job which, in present conditions, no other type of transport could do.

One of the reasons why petroleum products have a confined, and thus sheltered, market—however vast it may be—has been covered in the preceding chapter on transport. The fact that the main potential competitor for petroleum used as fuel is coal, a solid, makes it awkward to switch over from one to the other without altering a good deal of equipment,[7] and this makes such markets unreactive so far as short-term price fluctuations are concerned.

While it is true that there are no other materials which, in their own way, could give similar service, it is also true that there are no equivalent materials to take the place of petroleum products in the internal-combustion engine or in the field of lubrication.

From our survey of the technical background of the economics of a liquid fuel of the petroleum type we know the very high cost of making it from solid hydrocarbons (see p. 42). This fact places the ceiling of competitive substitutes so high above current values

of materials derived from crude oil that it need not be taken into account for the time being.

Considering all the factors I have enumerated there can be little doubt that on the demand side there exist few of the acknowledged automatic safeguards against rapid and extensive fluctuations in prices, which can easily be driven sky-high or knocked down to a fraction of their previous level without much relief from an expanding or narrowing market. It now remains only to review price structure from the supply angle.

Chapter 2

FACTORS ON THE SUPPLY SIDE

FROM what I have said of the advantages of large-scale production and of the paramount importance of working to capacity, it will follow that increase in output will, in the long run, tend to lead to price reductions. This, however, applies without qualification[8] only to marketing and refining, not to production; crude is, as far as our present knowledge goes, an irreplaceable, i.e. diminishing, resource, and it is by no means impossible that, at a given moment, increase in demand will make it necessary to resort to more expensive production methods, and also that crude, no longer being discovered at an appropriate rate, will assume a scarcity value which it has not as yet.

A further conclusion to be drawn from the influence of the "economics of a liquid" on its price structure is that cost plays a decisive role only in the long run, and that short-term fluctuations are entirely due to the circumstance of competition or to its absence, that is, to monopoly.

ELASTICITY OF SUPPLY

We have seen that high prices need not curb demand, but it is equally true that low "unremunerative" prices will sometimes fail to keep output in check. The small producer will—as will his opposite numbers among rubber or coffee planters—try, if prices are low, to produce more and not less, so as to make a bare living, and the highly capitalized refiners and marketers may find it more profitable to maintain their turn-over and, incidentally, their standing in the industry, even if this involves heavy losses.

This point, in particular, is fundamental to any history of the petroleum industry, and there will be more to be said about it; here and now, however, one factor matters which, incidentally, cuts right across all that has been said about how little demand is affected by the price level of petroleum products.

Whereas it may not make much difference to the consumer whether petrol costs 1s. 2d. or 1s. 7d., it is a matter of life and

death for a distributor to have to sell at a penny more than do his competitors of equal rank.[9]

There are, of course, "premium" and "regular" grades. Their differences in performance are sometimes fictitious[10]—sometimes, especially lately, very real—but, be this as it may, the consumer-in-the-street is, within each category, faced with a number of brands which he considers as being, generally speaking, on one and the same quality level. Shuman, in his *Petroleum Industry*, shows that, unlike the lube oil business in which each of the several competitors can build up a sort of private monopoly of his own, gasoline is *one* market:—

> "The American motorist has yet to be persuaded, in the mass, to ride a mile for a gallon of 'Speedo' gasoline, if by riding two blocks he can get his tank filled with 'Swifto' for the same price, the best efforts of advertising agencies notwithstanding."[11]

If, then, the price of one of the competitors is lowered the others must either follow suit or face a big and immediate loss in gallonage. This is how this process has been described by American experts:—

> "The volume of any single supplier is extremely sensitive to any difference in price. Because the purchaser is in a moving vehicle, there is ordinarily no inconvenience involved in travelling from a station quoting a higher price to one quoting a lower price. It is this factor which serves as an incentive for each seller to move quickly to meet a lower price of a competitor and which makes for the substantial uniformity in the quoted prices of gasoline."[12]

The combined weight of all these features exerts a considerable strain on the price-forming machinery, at least as far as the main products—motor spirit, kerosine, gas oil, and fuel oil—are concerned. The low elasticity of demand extends no hope of relief by expansion or contraction of outlets; heavy fixed costs preclude an elastic production policy and, finally, the extremely competitive character of the products we have just discussed makes it all the more difficult to smooth over differences when they arise. Indeed, it can be said that in the absence of automatic appliances for its prevention, the smallest spark is liable to develop into a general conflagration.

There are, however, redeeming constituents in the economics of petroleum which deserve our closest attention: the fact that out of a given crude can be made a whole range of finished products, which can be sold at different prices; and, secondly, the possibility of varying the percentage yield of these various products which has endowed the petroleum industry with that degree of freedom essential to its perfection and prosperity.

SHIFTING BORDER LINES

Crude oil, this mixture of chemical compounds so complicated that it still defies definition, could not be used in its original state; for all practical purposes it was, on the one hand, too heavy, dark, and smelly, and, on the other, too inflammable. The problem of selective segregation was solved by evaporating the crude and by condensing it in fractions—in fact, by distillation. The dividing line between the fractions being purely arbitrary, there is considerable latitude as far as actual yields are concerned. There has always been a kind of no-man's land—or both-men's land, if you like—between, say, motor spirit and kerosine, and also between the latter and gas oil, which could be considered as belonging to one or the other of the neighbouring fractions according to what the refiner was after.

When, more than twenty years ago, the problem of supplying sufficient light motor fuels by traditional methods became unmanageable—there would then have been hardly enough crude to go round on the basis of an average of 20 to 25 per cent. yield of motor spirit obtained by straight-run distillation—the cracking technique, heat treatment of heavy oil under pressure, was developed. Thus the average yield of light fractions was raised to more than 45 per cent., and residual oils, otherwise just fuel to be burnt under the boiler, were transformed into high-grade material. Two birds were killed with one stone, since without cracking, even if there had been enough crude, the quantity of heavier oils which would have had to be made to get the necessary amount of petrol would have created a glut in the market, and might have brought down the price to next to nothing.[13]

As it was, however, the stability of the market was assured by this very opportunity to vary the amount of the several products originating from a given crude. It was also open to operators to develop such crudes as yielded most of the products which were in demand at the time.[13] On a limited scale this made for a fairly *high elasticity of supply*.

BY-PRODUCTS ALL

The relation of prices to yields can only be fully understood if we keep in mind that *any one petroleum product can be made only if others are derived simultaneously*.

The occurrence of what is called "joint products,"[14] which cannot be produced one without the other, is not peculiar to

petroleum—agriculture provides a great number of examples of the wool/mutton type, and the gas industry is familiar with the gas/coke/benzole triangle—but for petroleum the interplay of the several products is of a very special significance if only because there is a whole gamut of them.

There is, first, the difficulty of assessing the cost of any one product. The refiner knows what it costs him to make the whole lot together, and it is possible in some cases to single out certain finishing processes, like fractionation of spirits and chemical treatment of lubes, but it is practically impossible to find out how much of running expenses and overheads should be allocated to any one product.[15]

Ever since the early days of petroleum have people racked their brains to find some sort of makeshift solution of this insoluble problem.[16] The obvious idea has always been to pick out the most important product—kerosine in the early days and gasoline for the last generation or so—and to consider all the others as by-products. To this way of thinking the premier product, as I have called it, would be held to bear the brunt of manufacturing costs, but there would be continuous adjustments by transferring part of the cost to such by-products as could bear it by virtue of the prices they could fetch in the markets for which they catered.

The shift of importance from one product to another which goes on continuously—gas oil, diesel oil, and distillate fuels, for instance, have been coming into their own only recently—justifies the idea that each type can be looked upon as being a by-product of all the others or, better still, that all of them are to be considered as *co-products*. As it is impossible to work out—except for finishing processes—the production cost of the individual products, we shall find that their actual prices are determined by a method which runs parallel to that of costing just mentioned: *each product sells at the price its market will bear.*

DISCRIMINATION

Any student of economics is familiar with this conception as the one on which railway tariffs are based and, indeed, the similarity of underlying principles is striking. Originally the idea of railway freight rate-making was to charge freight according to weight or volume carried, but it was soon discovered that such an average rate was prohibitively high for certain bulky and cheap

materials, whereas other high-priced light-weight goods could have paid much more without their users feeling the pinch. This is one reason for what has been called freight discrimination; the other arose from the fact that railways are the classical example of undertakings with heavy fixed cost, whereas their prime cost—especially for "additional" traffic beyond a certain minimum—is extremely low.[17] Such relation of fixed to variable cost always creates the temptation to charge high rates for traffic which is secure, and to cut rates in cases where there is danger of competition.

Criticism against such apparent injustice was soon silenced, because it was clear to anybody who cared to investigate that railways could not operate on a flat rate, and the same principle was in due course accepted for public utility undertakings such as gas and electricity works, whose fixed/variable cost ratio is of a similar order.

The fact that railways appear to supply *one* commodity, the "ton/mile," electricity undertakings the "unit," and gas works the "therm," at varying prices to different customers made the fact of discrimination obvious. In the case of petroleum products it was disguised because the products themselves were different. This difference is, however, as we have seen, more apparent than real, the whole petroleum range consisting of co-products which are dependent upon each other's production.

The other day I saw in a book on, or rather against, advertising the statement that "the cost of refining petrol is a bare ½d. more than that of refining diesel oil, but at retail petrol costs 5d. more."[18] Such criticism is based on several fallacies. Part of the difference between the retail prices of the two products which, incidentally, can hardly ever have been as big as that, unless the author overlooked the tax position, is due to the more elaborate retail network required for the sale of petrol to millions of customers, whereas the diesel oil market is still in the semi-industrial stage.

But where the argument against selling motor spirit and gas oil at different prices falls down is in the implied assumption that the former could easily be brought down to the level of the latter, whereas the opposite is true. The low price of certain products is actually dependent on the sale of one or more "premium" materials. Originally kerosine—"illuminating oil" (or just "petroleum refined"), as it was then called—was the mainstay, as late as 1907 an official United States publication grouped all others

under the heading "By-Products."[19] Earlier, however, motor spirit was just an unmitigated nuisance: every contemporary account contains stories like this:—

> "One Cleveland refiner of early days has recorded how he slipped out at night to let his gasoline, for which the market was not yet developed, run into the Cuyahoga River. The inflammable liquid was dangerous to keep about—and also dangerous to put into a navigable stream. Many a refiner was summoned to the police court and scolded for letting out gasoline."[20]

It was not until about 1904 that the price for "naphtha and gasoline" rose above that of kerosine.[21] Subsequently the gap between gasoline, on the one hand, kerosine and gas oil on the other, became considerable, but the advent of cracking, of the diesel engine, and of agricultural uses of kerosine tended to equalize the opportunities of the three with the almost immediate result that their prices drew closer together and gasoline became noticeably cheaper.

The different prices of petroleum products and their continuous variation are therefore not "just a ramp", but are the one and only method of keeping the industry on an even keel. Once again we can see the problem of oil against the background of other industries (including railways) with which it has some basic features in common. J. M. Clark, in dealing with highly capitalized industries, said that

> "if one had to choose a motto of six words, expressing the most central economic consequence of overhead cost, the first choice might fall upon some such phrase as: 'full utilization is worth its cost,' but a close second would be: 'discrimination is the secret of efficiency.' "[22]

It may be argued, however, that discrimination in the strict sense of the word was possible only within a monopoly, as it exists for various reasons in the realm of railways and public utilities. If there obtains a state of monopoly where a seller's price policy is not affected by competition, then the absence of suitable substitutes for most petroleum products and the low elasticity of demand for some of them, create a semi-monopoly for the oil industry as a whole. It is—with the exception perhaps of fuel oils—possible to supply the several markets at different prices and remain in *each* particular case on a lower price level than potential competitors. This is, on the grand scale, tantamount to the railways' policy of encouraging "additional" freight at the expense of the "safe" one.

There still remains the question of how competition *among* refiners, which qualifies the statement on the "monopoly" of the

industry, affects the picture *as a whole*. It certainly does so to a great extent in so far as every refiner inclines to concentrate on products which pay and to cut out dead wood. Such competition would appear to eliminate the possibility of charging prices for certain products up to the limit of what the market can bear. On the other hand, this is mitigated by the fact that, however flexible the production process may be, there are definite limits to the shifting of fractions, limits which are set by the chemical structure of a given crude oil, and, incidentally, by the cost of the conversion processes involved.

NOTES AND REFERENCES

(1) "If price is lowered, the amount demanded will be increased much or little. If a given small percentage reduction of price (let us say 2 per cent.) leads to an equal percentage increase of the amount demanded (in this case also 2 per cent.), we say that the elasticity of demand is 1, or that the demand is of unit elasticity.... It will be readily seen that the total receipts from selling different amounts of product remain the same where demand is of unit elasticity; they increase as more is sold if the demand is elastic; they decrease as more is sold if it is inelastic." (E. A. G. Robinson, *The Structure of Competitive Industry*, London, Cambridge, 1937, p. 8.)

(2) It is fully realized that these, the variable, items are of much greater consequence to commercial vehicles like trucks or taxis. For them, on the other hand, the fixed cost of personnel, which is not of great consequence for those who run private cars, is of great importance.

(3) In the chapter dealing with the economics of oil refining the production of raw rubber was mentioned as another example of heavy fixed cost. At this juncture we find another instance of similarity: the main outlet for rubber is tyres for road vehicles, so that motor fuel and tyres are in much the same boat; both are subsidiary products, and quantities sold depend much less upon their own price than upon the degree of motorization. This double similarity has caused the rubber and oil industries to have several features in common—serious crises, violent ups and downs, prevalence first of big firms and eventually of government control.

(4) Lubricating oil is, however, only one of a great number of similar cases of irrational "buyer preference". This phenomenon

> "may exist without physical differences; trade marks, brand names, or the prestige of the manufacturer or distributor may be the significant elements. The important point is the buyer's psychological appraisal; the *belief* that a difference exists which makes one product more desirable than another at the same price, or that the payment of the premium for one as compared with another is warranted. Commodities of this kind may be termed 'differentiated.' " (*Investigation of Concentration of Economic Power*, T.N.E.C. Monograph No. 1. Saul Nelson, V. G. Keim under E. J. Mason, "Price Behaviour and Business Policy," Washington, 1941, p. 6 *et seq.*)

(5) Such extravagance is characteristic of the marketing of most petroleum products, but it is often thought to be justified by the profits to be derived from the sale of lubricants. Harold L. Ickes said once in an address to A.P.I. (as quoted in S. B. Pettengill, *Hot Oil*, on p. 256) that the competitive struggle for gallonage might make "gasoline in course of time come free," leaving lubricating oils as the only paying proposition.

[6] The following table—based on figures published in Petroleum Press Service, London, 1935, No. 20—gives an idea of the extent to which motor spirit prices paid by the European motorist have lost all relationship to the market value of the material itself.

Town	Duties and Taxes in per cent. of c.i.f. Price	Duties and Taxes in per cent. of Flling Station Price
Rome	861	71.0
Paris	651	73.4
Berlin	521	56.6
Vienna	391	64.4
Prague	353	52.4
Brussels	335	65.5
Amsterdam	310	52.4
Zurich	305	54.7
London	232	44.4
Budapest	216	51.2
Copenhagen	173	41.9
Oslo	155	38.5
Stockholm	152	37.4

[7] A notorious exception is shipping, where the day-to-day competition of fuel oil and coal is very real. Ships fitted with diesel engines, however, are not subject to similar interference.

[8] Refining and marketing are, of course, subject to the general rule that cost per unit rises once the true capacity of a plant or organization is exceeded. It is also obvious that if an additional plant has to be built so as to cope with rising demand it may not be suitably employed at first and thus make for higher over-all cost. Both these considerations do not, however, detract from the general principle that rising output spells falling cost.

[9] This does not mean that a smaller local firm could not occasionally sell unbranded stuff at even 2d. less than the big combines without disturbing the market unduly, but none of the big firms with their nation-wide sales organization could afford, for any length of time, to be undersold by a competitor of equal standing.

[10] The habit of over-emphasizing and even of inventing "special" virtues for some branded products is almost as old as the oil industry. Anybody with inside knowledge of certain lube oil trade practices will be pleased to read, in *The History of the Standard Oil Company*, by Ida M. Tarbell, dealing with early methods of Standard Oil, the following:—

> "The Standard Oil Company has a great number of fancy brands of both illuminating and lubricating oils, for which they get large prices—although often the oil itself comes from the same barrels as the ordinary grade" (Vol. II, p. 217).

[11] R. B. Shuman, *The Petroleum Industry: An Economic Survey*, Oklahoma, 1940, pp. 128 *et seq.*

[12] *Investigation of Concentration of Economic Power*, T.N.E.C. Monograph No. 39–A: "Review and Criticism on Behalf of Standard Oil Co. (New Jersey) and Sun Oil Co. of Monograph No. 39, with Rejoinder by Monograph Author," Washington, 1941, p. 46.

[13] As it so happens, the one American crude which was the first to be developed on a large scale—the Pennsylvanian, or better, the Appalachian type—contained a comparatively high percentage of those fractions which were then readily usable: kerosine and lube oils. To-day, however, the same crude, though still valued for its lubricants, yields poor gasoline, with a low octane number. Another instance is that, just before the advent of thermal cracking, crudes with a high yield of straight-run gasoline were the most coveted.

[14] Problems of "joint products" are discussed by J. Maurice Clark in *Studies in the Economics of Overhead Costs*, Chicago, 1923, pp. 98 *et seq.* This work contains a great deal of information on the real problems of industrial economics.

[15] For a very interesting statement on this question see R. E. Wilson before the T.N.E.C. (*Petroleum-Industry Hearings before the Temporary National Economic Committee*, A.P.I., New York, pp. 363 *et seq.*). See also Raymond W. McKee, *Handbook of Petroleum Accounting*, New York and London, 1938, p. 316 *et seq.*

[16] Notwithstanding the general link-up of all materials which crude oil yields there is a still more intimate relation of some products which are isolated during "refining" in the narrower sense of the word: paraffin wax is produced by chilling and filtering parts of the lube oil fraction of certain crudes, but this process would have to be undertaken even if the waxy components had no use of their own because their presence would send up the oil's pour point to a prohibitive level. This is obviously a factor in the price build-up, and the similar relation of solvent oil/solvent extract is particularly interesting for this reason. When solvent refining first became industrially established the extract containing the compounds which were inimical to the efficiency of the material as a lubricant was separated and, the price it fetched as fuel oil being less than that of the crude, it could not contribute to processing costs which had thus to be borne by the solvent lube oil only. Should extracts prove, as they well may, to be the basis for certain plasticizers and resins, and should they be disposed of in a high-price market, the repercussions on the price of solvent lube oils would be far-reaching: as far as the latter are concerned the process of solvent-refining, even if plant cost should remain unaffected, would be considerably "cheapened" by the fact that only a certain proportion of total cost would then be attributable to the oil, the rest being borne by the extract.

[17] J. Maurice Clark, *op. cit.*, pp. 9 *et seq.*:—

> "It was the railroad itself that first brought the notion of overhead costs into real prominence with economists. When railroads were new, their rates were commonly uniform or nearly so, based on weight and distance, and were uniformly high. Soon it was discovered that additional traffic could be carried at little or no additional cost, and that reduced rates, if confined to classes of traffic not already moving, would increase the net earnings of the company. Thus classification was born and the foundations were laid for cheaper railroad carriage than would even have been possible without discrimination."

[18] Denis Thompson, *Voice of Civilization: An Enquiry into Advertising*, London, 1943, pp. 34 *et seq.*

[19] *Report of the Commissioner of Corporations on the Petroleum Industry*, Part II, "Prices and Profits," Washington, 1907, p. 230.

[20] Allan Nevins, *John D. Rockefeller: The Heroic Age of American Enterprise*, Vol. I, p. 269.

[21] The following table is based on figures taken from the *Report of the Commissioner of Corporations on the Petroleum Industry*, Part II, p. 231:—

	1880	1889	1899	1904
A. Illuminating oils average value per barrel of 50 U.S. gallons	$ 3.35	$ 2.82	$ 2.97	$ 3.37
B. Naphtha and gasoline	1.97	2.16	2.85	3.67
B in relation to A .. .. .. *less*	1.38	.66	.12	—
„ „ .. .. .. *more*	—	—	—	.30

[22] J. Maurice Clark, *op. cit.*, p. 416.

PART IV

THE SHAPE OF THE INDUSTRY

IF I had to sum up the results of my investigation and to define, in as few words as possible, the basic feature of the petroleum industry, I should say that what matters most is *that it is not self-adjusting*. Everything so far has pointed in the same direction:—

The aleatory character of drilling coupled with high exploration cost and low cost of exploitation;
the unwieldy relation of fixed and variable cost in refining, transport, and marketing; and, finally,
a price structure that allows for ups and downs which fail to bring relief from dearth or glut.

All these facts make for continuous crises: "the problem of oil is that there is always too much or too little".[1] Hectic prosperity is followed all too swiftly by complete collapse, and redress can be hoped for only from the efforts of "eveners", adjusters and organizers, whose success derives from the very peril to which the industry must succumb if they were not to lay down the law. If this is the layout of the industry—what is its history?

Chapter 1

THE GREAT PLAN OF JOHN D. ROCKEFELLER

WITHIN a few years of Drake's discovery of oil in commercial quantities two main trends could be distinguished: it was evident that oil was being produced at a rate which left consumption far behind and yet, at the same time, when oil was actually running to waste, people began to worry about the impending exhaustion of the resource. No later than October, 1861, a writer in the *Derrick* reported:—

> "Fears are entertained that the supply will soon be exhausted if something is not done to prevent the waste."[2]

Of the two threats, of that of "too much" and "not enough," the former was the more immediate and the more consistent, but the latter, the spectre of eventual shortage, remained as an undertone and sprang into prominence immediately when, for a time, no big new pools were discovered.

Already early in 1869—years before the first attempt at oil monopoly was made—a Petroleum Producers' Association cropped up in the Pennsylvanian Oil Region "to protect the interests of the well owners."[3] From then onwards time and again the same problem arose: how to keep production of new wells within the limits set by actual demand. No reader who has followed me in my survey of the basic facts of the industry can be in any doubt why there was such a strong urge towards an understanding between competing producers right in the heyday of *laisser faire*. Such understandings were not, in the first instance, designed with the deliberate purpose of charging customers extortionate prices, indeed, when things took a turn for the better they swiftly disappeared. They were nothing but emergency measures, applied only when the bottom had fallen out of the market.

The elimination of the weaker competitors by the mechanism of price fluctuations, acceptable in markets where the mills grind slowly, was always felt to be inadequate in the realm of crude production where "jerky" developments were unavoidable. People who live on the banks of a torrent are bound to think of building dykes.

EARLY ESSAYS IN RESTRICTION

This first endeavour to unite oil producers on a strictly voluntary basis, however, failed, as did all subsequent schemes of a similar character. If we consider for a moment the structure of any such association, we shall realize why this fate was inevitable. The immediate incentive for an understanding among competing producers was usually the discovery of a new and—at least in its early days—highly prolific field which upset the existing market situation in a complete, albeit temporary, fashion. The clamour for the only possible relief, for a limitation of new drilling and in the last resort, for a partial shut-down of producing wells, would first come from owners of older wells whose production was already on the down grade, and who could less easily afford to accept low prices than those whose flush production helps to make up for a small return per barrel. But this is, after all, only a difference in the degree of concern about low prices. Once the problem is settled, as to how the sacrifices, which the "understandings" involve, are to be shared, the scheme may become operative.

Smaller supply will send prices up to a satisfactory level.[4] The very success of such a scheme, however, is always liable to be its undoing: the better the price the greater is the temptation to increase one's output by overstepping the allotted "quota", and those who cheat first actually reap the double benefit of good prices *and* large sales. Once this habit spreads, and a contagious disease it is, it will be only a short time before those who have not benefited from such practices will smash the agreement altogether. Such stories of the making and breaking of horizontal agreements are not, of course, confined to the oil industry. However, the dynamic character of petroleum, unpredictable discoveries, and difficulties of storage, have rendered these problems particularly acute. Their solution is at once vital and difficult, absolutely imperative and almost impossible. Although there is more to be said on this point, I only want to suggest here that such an agreement between a great many independent operators who reserve their right to withdraw from it at any moment is nothing but a temporary expedient. Its structure has much in common with the ancient Polish diet where the dissent of any one member—the *liberum veto*—could throw the whole machine out of gear. The weakness of such an understanding is that while it needs the consent of an overwhelming majority to launch

it, it can be wrecked by the defection of a small, if determined, minority.

Such a system is not as democratic as it at first appears. Democracy works only if the minority accepts the ruling of the majority, because both have certain values in common. An association of straight competitors with equal opportunities may have its day, but it will not last, since the interests of the participants are, however paradoxical it may seem, to such an extent *identical* that they *cannot*, in the long run, be *compatible*.

The urgent need for bringing supply in line with demand, and the great difficulties for producers in achieving this end, were well understood. It was Rockefeller who, when asked by an investigating committee if his monopoly of oil refining and oil transportation had not prevented the producer from getting his full share of the profits, once said:—

> "The dear people, if they had produced less oil than they wanted, would have got their full price; no combination in the world could have prevented that, if they had produced less oil than the world required."[6]

The competitive position of crude producers was poised more delicately still by the fact that—in the circumstances as they prevailed in the United States—the number of well owners was unavoidably greater than that of their only customers, the refiners.[6] It is thus not surprising that the first effective and properly thought-out attempt to obtain control of the industry was born and bred in the refining sphere. Whereas, especially under primitive conditions, success in the drilling of wells was a matter of daring and luck, the qualities which made a good refiner were very different. From him technical ability and accomplishment in matters of organization were vital. These features were, however, not alone sufficient to lift those who possessed them above the rank and file. Refining, though a narrower field than production, was still too widespread to be "controlled". As a matter of fact, none of the usual features which help to establish monopolistic control over a trade was present in the refining industry of those days; raw material was not scarce, nor was it in the hands of a few producers; patented processes or manufacturing secrets did not exist, nor was the capital required for building an efficient refinery excessive.[7] Only if a bottleneck could be discovered or created, would there be a real opportunity to regulate the industry.

CONTROL OF KEYPOINTS

What does control of an industry mean? Is it necessary to own all its resources and equipment to exercise control? Obviously not, as such complete sway could be achieved only *after* a great measure of control had been established. What control presupposes is effective power in certain parts of the industry which, by reason of their role within its structure, carry without much further effort all the rest of it. The task of destroying Germany's war potential by bombing, first undertaken in earnest in 1943, could not destroy each and every aircraft or engine works. So the Allies set out to eliminate ball-bearing factories, of which there were comparatively few, in order to smash one vital link without which most of the others were of little use. Concentration of attacks on synthetic oil plants and, earlier on, on marshalling yards was the result of the same conception—such is the fine art of "control".

It would be impossible to "rule the waves" by patrolling every inch of the Seven Seas, but it is possible to hold the strategic points. Whatever happens in the Mediterranean, it is controlled, in the end, by those who possess Gibraltar, Malta and Suez. There are some Gibraltars in the history of oil power.

FIRST BOTTLENECK: RAIL TRANSPORT

Strangely enough, the key to mastery over the petroleum industry lay outside its own orbit. It was to be offered on a silver plate by the railways competing for oil freight. Thirty years later, when the public began to wonder how certain groups had managed to become all-powerful, it was difficult to realize to what extent practices which seemed downright unfair in 1905 were an integral part of the set-up of the 'seventies. At that time the competition between the several railways serving any one area was at its peak. As they had not achieved co-ordination of their services and tariff structure—a goal to be reached only some time later—they concentrated on securing the freight of the more potent shippers by offering them certain advantages, whereas the smaller fry had to pay the "official" rates. This practice was by no means confined to oil traffic, it just so happened that its repercussions were particularly severe in the petroleum industry, and there only because of the importance of the transport factor to the industry, discussed so fully earlier in this book.

In their own way the railways acted rationally: once it was realized—as realized it had to be—that discrimination between various types of cargoes was unavoidable, should railways be in a position to cater for bulk cargoes of low-priced materials, there was no reason why they should not also discriminate in favour of the larger customers whose patronage would help them a long way on the road to prosperity. Lesser concerns had no bargaining power, the volume of their freight was too small to matter much either way: they were the hindmost and the devil took them. Moreover, the big shippers were not only the bone of contention between competing lines, they were equally important, nay indispensable, once the railways had concluded one of their frequent, if short-lived, "understandings" on freight and tariffs. That such co-operation of competing railways was so essential and, at the same time, so difficult, proves once more how similar are the basic problems of railways and the oil industry. Indeed, the following description of the behaviour of railway managements could have applied to petroleum affairs right down to our days:—

> "During the years from 1869 till 1873 the agents of the roads met annually at New York to agree upon freight rates; and afterwards, in order to get traffic, they regularly broke their agreement."[8]

One of the main methods of implementing the understanding on certain quotas for each participating railway company was

> "to appoint a group of the largest shippers as 'eveners,' and in return for a special rebate require them to apportionate traffic among the roads," this "seemed at that time a practice both inevitable and legitimate",[9]

indeed, it was planning *par excellence.*

This weapon of preferential freights has been wielded with great success and it helped towards establishing what, in due course, became the *de facto* monopoly of the "Standard"—but it is as well to appreciate that *this monopoly was the direct outcome of its antithesis, the violent competition amongst the railways.*[10]

MONOPOLY IN THE MAKING

> "The industry assumes an hour-glass configuration, with the raw material drawn from innumerable sources, concentrated into channels of flow through the transportation and refining systems, and again deploying into myriad lines of movement to countless points of final consumption." (J. E. Pogue).

Although developments in the American oil industry during the period from 1870 to 1910 were dominated by the personality and the conception of John D. Rockefeller and his Standard Oil

Company, it is pretty certain that he was not the first to envisage the possibilities of establishing "control" of the oil industry as a whole. The authors of the first attempt at using transport as the Archimedean fulcrum wherefrom the whole industry could be levered at will, are not known, but if we can rely on Ida Tarbell's description, they must have had a pretty shrewd idea of its possibilities. Indeed, here we have the whole problem of the "Gibraltars" in a nutshell:—

> "In the fall of 1871 certain Pennsylvania refiners, it is not too certain who, brought to Mr. Rockefeller and to his friends a remarkable scheme the gist of which was to bring together secretly a large enough body of refiners and shippers to persuade all the railroads handling oil to give to the companies formed special rebates on its oil, and drawbacks on that of other people. If they could get such rates it was evident that those outside of their combination could not compete with them long and that they would become eventually the only refiners. They could then limit their output to actual demand, and so keep up prices. This done, they could easily persuade the railroads to transport no crude for exportation, so that the foreigners would be forced to buy American refined. They believed that the prices of oil thus exported could easily be advanced fifty per cent. The control of the refining interests would also enable them to fix their own price on crude, as they would be the only buyers and sellers. The speculative character of the business would be done away with. In short, the scheme they worked out put the entire oil business in their hands."[11]

This brilliantly logical plan broke down before it had a chance of maturing, perhaps because success is seldom granted to those who conceive and canvass a good idea, but is reserved for those who pursue their purpose silently, step by step, taking infinite pains. Where this "South Improvement Company" failed dismally and ignominiously John D. succeeded only a few years later.

It is not definitely established that Standard Oil rose to its paramount position "solely on account of its superior efficiency", as one of its apologists has put it,[12] but the opposite conception—that it owed everything to fraud and blackmail—is still less true.

To start with, there certainly were Rockefeller's deep understanding of how a works has to be run and the supreme technical and commercial performance he achieved. Being just one length ahead of the others, permitted him to wield successfully the weapons of freight drawbacks and other discriminatory practices. All that, however, would not have opened the road to greatness, would not have raised him above the standing of a successful business man: what made him the pioneer he became were his insight into the problems of concentration and his method of organizing an industry.

His plan, from the very outset, was to form a nucleus round which his late competitors would rally. As Nevins put it—

> "his imagination had shown him that if the amorphous, overdeveloped, wasteful refining industry, prolific of bankruptcies and ruin, could be unified and firmly controlled, it might become an efficient source of wealth to the small group which reorganized it."[13]

Starting with the refiners of his "own" town, Cleveland, he bought up works which their owners had found difficult to run because they could not keep up the pace of their bigger and better competitors. The compensation which most of them got was pretty adequate, taking into account the works' actual earning capacity in the hands of their present owners,[14] but the value of their refineries in the aggregate was infinitely greater to the purchaser who was not out for *immediate profit*, but was seeking *power* so as to profit to a much greater extent. For a time we see this, if you like, vicious circle: higher throughput of Rockefeller's refineries—greater efficiency—bigger drawbacks from the railways—weaker competitors—higher throughput, and so on and on.

However well Rockefeller played his hand, the freight advantage on the railways would, in the long run, have turned out to be a *tour de force:* for a time it was possible to gloss it over, but the fact remained that *technically the "unit" of rail transport of crude was the railcar* (see above, pp. 36 *et seq.*), and that, if discrimination on the railways were ever to be outlawed, everybody who despatched a railcar would be on a level footing, whatever the scale of his freight.

SUPER BOTTLENECK: PIPE-LINES

At that stage, however, something happened which gave the "Number One" of the industry the opportunity of leaving all the others far behind; that "something" was the pipe-line. For, whereas the idea that his total turnover should be taken into account, when a special railway rate for a big shipper was fixed, was based on a *contract*, a pipe-line could, for *technical* reasons against which there was at that time no means of appeal, be used only by firms of considerable size. The paradox in this story is, however, that Rockefeller was far from being the first to realize the importance of this new method of transport; on the contrary, trunk lines were first sponsored by "Independents", bent on breaking Standard's privileged position in railway transport.[15]

By the time pipe-lines had become a means of transporting crude oil cheaply over long distances

"Rockefeller had achieved the substantial monopoly of which he had long dreamed. He ruled the empire of oil as Napoleon ruled Europe after Austerlitz—and there was no Wellington on the horizon."[16] He had, as Nevins put it, "built and consolidated his industrial domain largely through close attention to the problem of transportation. After his decisive war with the Empire and Pennsylvania, he apparently believed that his troubles in that sphere were ended; but if so, for once his foresight failed him. Despite the success of the Columbia Conduit Company and of his own line in pumping crude petroleum forty miles into Pittsburg, he acted as if confident that oil transport would remain indefinitely in the hands of the railroads. The sudden emergence of a heavy trunk pipe line making direct railway connections with the seaboard took him by surprise and threatened anew the practical monopoly which he had created."[17]

But again it was Rockefeller who reaped where others had sown, not because he had, by some trick or other, managed to steal their crops, but simply because *he* was the one who could make good use of a good idea. As pipe-line economics hinge mainly on constant flow, i.e. on steady and concentrated supply and demand, nobody was to benefit more by the advent of pipe-line transport than the biggest operator. A pipe-line made sense only as part and parcel of an adequate and balanced organization.

LEVIATHAN

For the first time we see the advantage of the complete organization, of what we now call the "integrated" firm. We are faced with the fact that those prevail who have at their command production and marketing on a sufficiently large scale to take superior transport methods into their service, and who can thus continue to improve their standing at the expense of their competitors. It is very illuminating to study the following statement on the present set-up by the late W. S. Farish, one-time President of the Standard Oil Company (New Jersey), as a comment on the position of his spiritual great-grandfather seventy years ago:—

"Integration," he said to the T.N.E.C. in 1939, "is the uniting into one business of several of the stages through which a material passes before it reaches the ultimate consumer. The conditions under which integration is desirable are: (1) large volume of business in a single commodity group; (2) highly specialized production, manufacturing, transportation and distribution techniques; and (3) substantial advantages (at some stages) in large-scale operation. These conditions characterize the petroleum industry, and it follows therefore that the relations between any one of the stages of the industry and the other next to it are peculiarly close. The refiner needs to be assured of his market. The marketer needs to be assured of his supply. Both need a steady flow of products for efficient operation. Neither is interested in other than the one major product and its related group of by-products. Neither can transfer his specialized equipment to the handling of some different product. There is a high degree of mutual interdependence imposed by the facts."[18]

Time and again people have asked themselves how it was possible for one man, starting from scratch, to build up such an organization as about ten years after its inception "controlled the transportation of oil by rail and by pipe line and produced 95 per cent. of the refined oil of the country,"[19] and which could twenty-five years later be thus described by the Commissioner of Corporations:—

> "In the year 1904 the Standard Oil Company and affiliated concerns refined over 84 per cent. of the crude oil run through refineries; produced more than 86 per cent. of the country's total output of illuminating oil; maintained a similar proportion of the export trade in illuminating oil; transported through pipe lines nearly nine-tenths of the crude oil of the older fields and 98 per cent. of the crude of the Mid-Continent, or Kansas-Territory field; secured over 88 per cent. of the sales of illuminating oil to retail dealers throughout the country, and obtained in certain large sections as high as 99 per cent. of such sales. It also controlled practically similar proportions of the production and marketing of gasoline and lubricating oil."[20]

What began in the Pennsylvania of the 'seventies developed according to a pattern which we can detect in the oil industry all over the world down to this very day: the ascent of one concern or of a group of concerns which, by centralization of control and by dispersion of interests, attains in due course a paramount position. The two features—centralization and dispersion—are of equal importance. On the former hinges the opportunity of making the weight of large-scale organization felt; on the latter the possibility of taking local difficulties in one's stride. A firm which can average out the result of widely separated enterprises can never be seriously afflicted by any one mishap, but, on the other hand, it can easily crush the opposition of a competitor, operating from a narrower base, by making a temporary sacrifice which, for the reasons just stated, does not endanger its whole fabric.

Such an explanation of success, mechanical, though in a sense to the point, hardly does justice to a process of much deeper significance. The paramount group in the industry whose power is a thorn in the competitors' sides, and may occasionally be a nuisance to the consumer, plays at the same time an important, nay, an indispensable, role in the industry as a whole.

Chapter 2

ON OIL COMBINES

OLD John D. always had a good conscience. When in 1888 he was asked during one of the Senate Investigations on Trusts, whether he really believed that

> "the Standard Oil Trust is a beneficial organization to the public", he replied without hesitation: "I beg with all respect to present the record which shows that it is."[21]

This was not sheer hypocrisy.

GRANDEUR OF THE BIG

Ida Tarbell, who took Rockefeller severely to task on certain counts, was compelled to admit "the inherent greatness of the Standard Oil", and a man of the detachment of John Ise said in so many words that

> "Directors of the South Improvement Company, and later of the Standard Oil Company, claimed that the purpose of their organization and activities was to secure greater stability in the industry, and there can be little doubt that their influence was general in this direction. One of the first results of the increase in the capacity of the Standard refineries was an advance in refining methods, with an increase in the number and an improvement in the quality of the products, and with a reduction in the waste of crude resource. There were also decided economies in the marketing of oil products. Many students of the question believe that, in spite of the reprehensible means by which the Standard Oil Company attained its dominating position, its influence upon the industry was generally salutary."[22]

This is how, according to Nevins, Rockefeller may have visualized his particular mission:—

> " He believed that the situation was not proper, and that the industry could not right itself. The theory of free competition worked well enough when an industry was restricted to a large number of small firms. But it ceased to work when a number of great establishments, like his own, entered the field. For when competition drove prices below production costs, these establishments could not resort to a temporary shut-down. Their overhead costs, the interest on investment, the charges for maintenance, continued. These were so heavy that bankruptcy loomed ahead if they were not alleviated. Hence the establishment was forced to carry on even at a loss, selling at low rates to cover *part* of its expenses. This period of cut-rate selling, of ruinous competition, of low wages and long hours, might be protracted for years, and then end in general bankruptcy. Thousands would be ruined, tens of thousands thrown out of work. Then the whole cycle would perhaps repeat itself.

> Rockefeller's practical approach showed that industry was outgrowing the old theories, and that the one solution was combination; the great units must combine, or their huge investment values would be wiped out."[23]

It seems probable that Nevins attributes to Rockefeller a train of thought which, though certainly correct, would hardly be that of a man who, as Nevins himself says, "had no trust in theoretical economics". Be that as it may, Rockefeller's "great idea" was certainly conceived with a view to forming a group within the industry sufficiently big to influence decisively the industry's policy and sufficiently broad to survive any earthquake or landslide. *It is obvious that what has been called the "beneficial" influence of such an outsize organization was nothing more nor less than the natural predilection of the big against violent changes.* He knows that however much he gains on one count, he stands to lose something elsewhere.

Thus the man who heads a big organization will be inclined to take the long view; indeed, he will be forced to do so even at the sacrifice of immediate gains, and all this will certainly make for "stabilization" or for what has more recently been called "orderly progress". Once more it is fitting to quote Mr. Farish, who said in 1939:—

> "My own company, the Standard Oil Company (New Jersey), is a big company in the oil industry, and I have not the slightest hesitation in saying that we are in business to make a profit. But we are in business not merely to-day and to-morrow, but also for a long time to come. Therefore, we can and do look at our problems with a long-run perspective; and in the long run we know that for a company as big as ours its welfare, that is, the welfare of its stockholders and its employees, is unavoidably bound up with the welfare of the country as a whole."[24]

GOLIATHS AND DAVIDS

The same pattern is shown throughout the whole history of the oil industry. The central motif is always a leading, sometimes a ruling, group—and clustered around it is a number of smaller competitors. To understand the polarity of *insiders* and *outsiders* is to have a key to most of the mysteries of petroleum. I use the word polarity quite deliberately, since they are not just opponents, they are complementary; the two of them together *are* the industry.

So far I have concentrated on the history of petroleum in the United States not so much because, as the Standard Oil (New Jersey) put it bluntly, "the world's oil industry is practically an American industry,"[25] but because there has been in the U.S.A. such an abundance of published facts and figures covering

all phases of the industry from its very beginning. The Americans, money-proud and thus figure-minded as they are, have a singular knack of amassing and digesting material relating to industrial developments, but there is more to it than that. The machinery of congressional enquiries—unwieldy though its derivatives may sometimes appear to the less patient stranger—is one of the features of a vigorously democratic style of life. A "pressure group" which has to come out into the open is less likely to be nefarious than a gang of conspirators which is allowed to work under cover.

In these circumstances it is not enough to be right, it is almost as essential to know how tc state one's case. Students of the economic problems of our times owe a great deal to the material presented in the course of this continuous sifting of evidence.

If for once I propose to refer to the European rather than to the American history of the co-existence of big and small oil undertakings, this is only because the picture in the United States is somewhat blurred by the legal problems created by the incidence of the Sherman Act. The permanent threat of proceedings under the Federal Anti-Trust laws has put a stop to the early development of a fully-fledged organization of oil interests and, whatever they may do in fact, it has become inadvisable for spokesmen of the petroleum industry to call a spade a spade. There is thus more to be learnt from an investigation of the events in countries where the industry was left to work out its own salvation by competition —or by restraint thereof.

CARTELS

Whereas, at least up to the first World War, the overall "control" of the oil industry was in America carried out by one paramount firm, elsewhere the picture was rather of co-operation by a limited number of more or less equal concerns of good standing with a great number of smaller firms, living on the fringe of such organization and still some more existing beyond the pale.

It is superfluous to argue whether associations of companies engaged in the petroleum trade are "really necessary"—the fact is that they have always existed in every country of Europe. A completely "free" market was the exception and a short-lived one at that. Untrammelled competition by oil companies in the field took place only during the aftermath of the breakdown of one organization, and represented no more than the period of preparation for a new agreement.

In a survey of "Cartels: Their Significance for American Business", *The Index* explained that

> "the development of cartels is encouraged if at least four sets of circumstances are present. First, the market must indicate a relatively steady demand. Second, the product must be standardized and easily definable with respect to quality. Third, the industry most liable to foster formation of cartels is that with heavy fixed or overhead costs or large transportation costs, or one which cannot be rapidly adjusted to changing market conditions. Fourth, members of the cartel must have a certain natural inclination for collective agreement and action. If there is a fundamental tendency to overproduction in the industry involved, these factors are apt to become more active. The number of manufacturers of a commodity must not be too large and their economic structure not too different." [26]

What was the object of these "understandings" between prominent producers, refiners and marketers? Does the traditional charge levelled against such a "ring," that it is formed with a view to keeping prices up by reducing the quantities available to the consumer, apply in the case of the oil trade? Is such a combine a conspiracy calculated to defraud the population at large, or is it a salutary organization which will safeguard the interests of the community? It can be either, but as it so happens it is more often than not in between the two extremes, a blend of wholesome and harmful ingredients. The members of a cartel are not in business for their health, but that does not mean that there are no healthy features in what they are doing. To quote the same issue of *The Index* again:—

> "Cartels do not necessarily mean higher selling prices, because business men have learned that efficient production, with a growing market stimulated by low prices, is more profitable than a limited market and high prices. Basic economic lessons of this character are not discarded just because business men form a cartel. In depression periods cartel prices have generally been higher than those of uncontrolled prices, but during boom periods the average of cartel prices has been well below that of the free market. In Germany fluctuations of cartel prices from 1926–31 was approximately one-fifth that of the prices in the uncontrolled market" (p. 32).

Once again it is the tendency to stabilize conditions rather than to drive prices sky-high that we recognize in all these moves.

NOT SO RESTRICTIVE

Whatever the position may be in other industries, one can hardly say that the oil interests have ever inclined to restricting the consumption of their products so as to make them rare, thus confining their use to the well-to-do. There is no reason to doubt the

sincerity of an early Standard Oil statement that "to stop the manufacture to raise the price was something they would never do,"[27] and on the whole this holds good for the entire oil industry all over the world. But even if spectacular rise in the output of oil is proof of the harmlessness, or at least of the ineffectiveness of restrictive schemes,[28] it remains true that it is difficult to draw a line between a policy of raising prices and one of preventing them from falling below, so to speak, subsistence level. The saying that cartels are "children of distress," quoted earlier in this book, is particularly apposite in the case of oil combines, because the petroleum trade has always been a buyers' market. If we eliminate temporary and local shortages from the trend, there was at any given moment during the last eighty years more oil readily available than was immediately marketable, or, to quote John Ise:—

> "Overproduction has been chronic. There has hardly been a time since 1860 when too much oil was not being produced."[29]

Against this background no restrictive policy, in the full meaning of the word, could have made sense. In view of rapidly expanding markets, the object of all associations of petroleum interests was rather, in the long run, to even out discrepancies of supply and demand than to restrict output.

This tendency towards retrenchment, if not towards restriction, is only the result of one of the industry's unorthodox features: the very fact that the rapid market expansion for petroleum has never stopped was the main cause of oil's perennial difficulties. The old saying that "the oil industry was born in a balloon going up and spent all its early years in the sky,"[30] still holds a grain of truth. Had a reasonably stable demand prevailed, the supply side would have found its natural level, but the knowledge that to-morrow there would be still more buyers for oil unavoidably caused the entrepreneurs to over-estimate their opportunities. Learned economists have taught us that man usually underrates future commitments, and it may be equally true that he tends to overrate opportunities of future profits. "Last year," oilmen would say to themselves, "demand rose by 15 per cent.; why shouldn't it be 25 per cent. next year?" It is also a fact that there is hardly a more fascinating pastime than allocating to oneself a share in a market which does not yet exist.

This state of mind encourages over-investment which can be remedied only by ruthless "cut-throat" competition, or by an agreement not to use one's capacity to the full. This sacrifice,

considerable as it is in view of the relation of fixed and variable costs, can be justified only if the necessary *quid pro quo* is forthcoming, i.e. if a satisfactory price level can be established.

In our study of the initial stages of Standard Oil's rise to supremacy we saw that its "monopoly" was first established as a sort of by-product of the ferocious struggle among the several competing railroads; here we have the same phenomenon within the sphere of petroleum itself. The predisposition to make an agreement with your competitor results from the fact that all-out competition leads, in certain industries, in the opposite direction, that is, to a monopoly of one sort or another.

The problems of such "monopolists," however, diverge widely from the text-book; the operators are not so much concerned with adjusting their output to the level at which the resultant price gives them the greatest possible profit. What matters to them is to achieve a *volume* of trade which gives them the overall advantage of large-scale operations, whereas the actual *price* is to some extent controlled by the lone wolf, the small outsider, the "marginal" seller.[31]

ACHILLES' HEEL

In the States crude oil production could never be brought completely under unified control, and there was on the world market a certain amount of competition from other sources, so that it was inevitable that the big units should be challenged whenever they tried to overstep certain limits. If they raised their prices to a level at which their smaller competitors could invade "their" happy hunting grounds, despite not being so favourably placed as regards rational production and transport and marketing methods, they began to lose ground immediately.

The Majors are always beset with certain difficulties: although petroleum certainly calls for "handling" in a big way, it *can*, on a different level, be produced and marketed on a small scale. This cannot be said of some other highly capitalized industries. We cannot, for instance, envisage a very small blast furnace, and it has, at least for the last twenty years, been impossible to build ordinary motor cars in other than large works.

Seeing that their policy of "price maintenance" is subject to interference by their less potent competitors,[32] the "Major" group will find it advisable to come to terms with them either by buying them up or by inducing them to join the "ring" as a full or as an affiliated member.

The characteristics of this eternal tug-of-war going on between the "Majors" and the "Minors" are most revealing. The reader will agree that for technical reasons alone the formation of paramount oil concerns was inevitable; their role could not be taken over by a welter of smallish firms. The existence of the "Independents", on the other hand, provides the ventilation which prevents the powerful firms making it "too hot" for the public at large. In a way the old grouse of the Majors that buyers tend to take the price from the small firm and to expect the large firm to deliver the goods is not without justification. The Independents, however, are justifiably conscious of their role, and they are wont to denounce what they call the conspiracy of their bigger competitors, but that does not alter the home truth that their livelihood depends more often than not on the very existence of these Majors, that is to say, on the policy the latter cannot help adopting.

First there is the inevitable drawback of big organizations which has always given the smaller men chances to infiltrate: a large concern up to a point takes on the features of a government department, and its executives are liable to become contaminated with what one could call "the Civil Servant's outlook." Apart from whatever greater versatility the individual traders or industrialists possess, they can sometimes take advantage of the necessity for nationally organized firms to do business all over a wide area at identical, or at least similar, prices. This inevitably means that the sales in the "easier" sectors have to carry the burden of costs in more remote regions. The smaller firm can concentrate on remunerative markets and, if the going becomes too heavy, can call a halt without losing face.

GIVE AND TAKE

Apart from these general factors there remains the very tangible concern the Independent feels for what is sometimes called the "Combine," whose existence is, from his point of view, so much to be preferred to a free-for-all fight.[33] There is the case of the man who operates in a "controlled" market[34] the bulk of whose members have undertaken to observe certain rules—or "Codes" as they were at a time called in America. Nobody can be in a better position than he whose price is protected by the self-denial of others, but whose trade volume is unrestricted! There is no more enthusiastic satellite than the biggest operator outside the ring—but, alas! the more successful he becomes the greater his danger of cutting off the branch upon which he is

sitting. For, beyond a certain point, his interference becomes intolerable to the trade powers-that-be and he is faced with the alternative of allowing the "ring" to disintegrate, and thus losing his former preferential position or of joining the inner circle himself.

Thus, while the position of the biggest "outsider" is the most desirable, the lot of the smallest "insider" is the most uncomfortable. He has to put up with most of the snags of co-operation and reaps few of its choicest rewards. In the technical and in the distribution sphere he finds it difficult to keep up with his bigger brothers, yet he is deprived of that natural weapon of the interloper, the under-selling of his competitors. It is therefore not surprising that the big firms very often see fit to cater for this "lower middle class" by offering them preferential terms of some kind or other.

The Majors *will* make every effort to rope in as many of the smaller firms as possible, because in the case of groups controlling more than two-thirds, or even three-quarters, of an industry terrific strength has as its counterpart extreme vulnerability. If a competitor who commands but 5 per cent. of what I am selling can mess up all my markets, then it will be only common sense for me to make considerable sacrifices to keep him from doing so. This is what has been aptly called the nuisance value of the sub-standard competitor. That this relation of the two levels of the industry was not confined to Europe could be seen at the time of President Roosevelt's N.R.A. experiment. Only the other day, reviewing its history, Mr. W. T. Holliday, President of Standard Oil of Ohio, talked about "the power of the last 15 per cent. who stay out of a Cartel agreement".[35]

It is obvious, therefore, that the "market leaders" will first try to crush a competitor and when, for one reason or another, they fail in this campaign, they will very soon accept him with full honours as a sort of junior partner.[36]

As the only deterrent to such a policy of "appeasement" there remains always the fear that favourable terms accorded to the convert will be interpreted "*pour encourager les autres*". The newcomer to the trade is of course the bugbear of vested interests—large *and* small—and if they could be certain that there were no more in the queue, it would pay them to be more generous still towards their existing competitors. Incidentally, these facts, as I see them, give the lie to the widely canvassed contention that the big firms who have moulded the shape of the British war-time

"Petroleum Board" have shown a splendid and unselfish spirit by according the smaller fry such fair terms. Indeed, the Petroleum Board set-up is the oil empire builder's paradise; new competitors are barred by definition or by order, and whatever the sponsors of the Petroleum Board have bestowed on their weaker brethren they have got tenfold for themselves, just as is the case in any well-organized cartel. To give most of the "Independents" a square deal was not only a very shrewd move politically, but the men who made it were following faithfully the deep-seated tradition of discriminating sharply between the established competitor one has to put up with and the newcomer one wishes to keep out.

CARTELS ARE BRITTLE

Lionel Robbins once said[37] that he preferred cartel monopolies to restrictive arrangements, based on customs tariffs, as "tariffs tend to stick, monopolies tend to break". The existence of all such arrangements, both of the tacit or of the explicit variety, is indeed not a happy one. The participants are precariously poised on a shaky raft, and not only have to contend with wind and weather, but also suspect that their neighbours wish to cast them to the terrors of the deep. The antagonism of Majors and Independents is not the only problem. There are also the very great difficulties the Majors find in coming to terms among themselves.

It is perhaps proper to distinguish between static and dynamic phases in the co-existence of two or more groups of similar standing—though not necessarily of equal size. As long as all members of that class are more or less satisfied with their own share in the market—the word "market" being used here in its widest sense, including production, refining, transport, etc.—as long as the "AS IS" basis is generally accepted, there is every incentive for close co-operation.

The problem of dealing with the "Independents" can be tackled more effectively if there is active co-operation between those who, though they will benefit in the end, have to make some sacrifice first. Then there is the problem of balancing supply and demand, and the problem of reducing cost by avoiding duplication of effort and, indeed, many others in which long-term and short-term interests call for a "Concert" of the Majors.

The happy days when the spheres are in harmony are, however, interspersed with recurrent periods of a dynamic nature when the demigods elect to contend one with the other and when oil empires are won or lost.

If there was need of proof to show that there is no such thing as an absolute oil monopoly, it could be provided by the fact that we have, within the lifetime of one generation, witnessed the advent of a number of groups now commonly considered, even on a world scale, as major oil powers.

The last ten years prior to this war were an era of comparative peace in the highest reaches of the industry, but during the preceding two decades there was a period of amazing convulsions and no outline of the "shape" of the industry would be complete without a record of these events.

Chapter 3

THE IDEAS OF HENRI DETERDING

ADVENT OF A NEW POWER

THE *state* of greatness may be awe-inspiring, but what is really fascinating is the *rise* towards that greatness. To hear how Rockefeller created from scratch the nucleus of what was to be later the world-wide Standard Oil organization stirs our imagination, and to follow the devious path by which a young Dutchman, called Henri Deterding, made himself an international figure and his company a first-class power, is thrilling as well as instructive.

The story of the rise of the Royal-Dutch-Shell group has been told by several authors,[38] and Sir Henri himself has seen fit to give us a glimpse into his mind.[39] I intend to confine myself to giving an outline of the principles on which the new venture appears to have been based.

Deterding has given us one or two hints which should put us on the right path. Originally the "Royal Dutch Company for the Working of Petroleum Wells in the Dutch Indies" was a local company in the Far East, and it was only natural for its managers to sell in the nearest markets, i.e. in India and China, as these areas were at that time huge consumers of American kerosine. In the task of supplying "oil for the lamps of China" the East Indies fired point-blank, whereas the Standard Oil operated at ultimate range. At that time Standard Oil was a strictly centralized company whose entire industrial activity was concentrated in the States. Its directors, conscious of the virtues of large-scale production, thought that they had no business to produce or refine oil anywhere but at home, and they relied on their striking and staying power to carry them through to success, should a foreign producer choose to challenge their supremacy in any given territory.

"STRAIGHT LINE"

Deterding soon grasped that the first condition for success against a paramount competitor was not to imitate his methods but, if possible, to do exactly the opposite. Working on what he

later called "the principle of the straight line," Deterding won the first round by making use of his advantage in the transport field.[40] The fact that Standard—of all people—should have suffered from somebody else's transport supremacy proves once more the old saying that empires are destroyed by the very forces which helped to make them. As late as 1920 Sir Henri made it clear

> "that the advantage of having production not concentrated in only one country, but scattered over the whole world, so that it may be distributed under favourable geographical conditions, has been clearly proven. It hardly needs to be mentioned that the American petroleum companies also realized, although too late, that it was not sufficient to have a large production in their own country. As regards our own group in this respect, its business has been built up primarily on the principle that each market must be supplied with products emanating from the fields which are most favourably situated geographically."[41]

The principle of the "straight line," however, implies more than transport factors only: it meant to Deterding the vertical control of the whole process from the search for oilfields down to the consumer. In his memoirs he not only referred to the advisability of selling

> "in those markets which were nearest to our oil-producing fields,"

but he said in so many words that

> "it didn't need much pondering, but only some slight degree of insight on my part to see that following this straight line in our case simply meant that—by our own efforts and with but little outside help whenever practicable—we, of the Royal Dutch, must set ourselves to bring the oil from our wells to our customer with the minimum of delay."[42]

When he confronts his own policy with that of the Standard Oil, he does not talk of the difference in the length of the haul only, he envisages an altogether divergent principle:—

> "This straight-line policy was, of course, the direct reverse of that of the Standard Oil, whose preference all along was for merchandising on a gigantic scale rather than for the actual production of oil."[43]

Now it is well worth realizing that the fact that Standard kept aloof, up to a point, from production and concentrated on refining and marketing, i.e. that it followed the policy deprecated by Deterding, has always been held up as a particular feat of industrial acumen. To quote an example, Ise points out that:

> "the wisdom of the Standard Oil management was shown in the scope of business covered. The Standard early left the producing end of the business—the most speculative and the least profitable—to independent enterprise, but ruthlessly crushed out almost all competition in refining and transportation."[44]

ANOTHER BOTTLENECK

What makes this difference of opinion so interesting is that *both* principles—Rockefeller's and Deterding's—are sound, and which of the two is applicable depends entirely on the circumstances. Perhaps Ise's statement provides the solution. Within the framework of the United States oil industry of the 'seventies it was, as I mentioned a short while ago, hopeless to try to "control" crude production as such, but refining-cum-transport provided the necessary bottleneck. However, at the beginning of the twentieth century we find the position almost reversed. Now, with new fields discovered and developed, not in the heart of an urban civilization as that of the United States, but in far-away and climatically difficult countries, the *"unit" of crude production had become much larger and, for the first time, it was possible to achieve semi-centralized control of essential sectors of crude production.*

Indeed, the advent of Royal Dutch Shell coincides with the introduction of the East Indies, Mexico and Venezuela as important suppliers.[45] In none of these countries, not even in Mexico, did conditions prevail which would permit the small wild-catter to operate in the same way as he did, say, in Pennsylvania or Oklahoma. To obtain a concession great influence and sometimes bribes to the tune of a prince's ransom were required, and to start drilling meant a colossal preliminary outlay on road building and housing, on tankage and pipe-lines, commitments to be undertaken by the strongest groups only. It was the shrewd Deterding and his associates who realized that with the geographical shift of crude production towards the outer perimeter the shape of the industry had changed.

There is still another reason why the Shell people viewed the position in a way very different from the "classical" approach of Rockefeller's disciples. When John D. appraised the situation he was confronted with a seemingly abundant supply of oil and a still comparatively narrow market; *he thought rightly that the supply of crude would look after itself if he could only control the marketing end.*

When the Dutchman Deterding and his English friends, all born and bred in countries without indigenous crude production, who had lived to see the spectacular rise in consumption in the train of the progress of motorization, when they weighed up their problems, they saw that it was vital to possess the oil, and that *whoever controlled the crude could almost let the disposal of the*

finished products look after itself. Any reader of Lord Fisher's memoirs must have been struck by the forthrightness of Deterding's statement on this subject. This is what Deterding said shortly before the last war:—

> "Oil is the most extraordinary article in the commercial world, and the only thing that hampers its sale is its production. There is no other article in the world where you can get the consumption as long as you can make the production. In the case of oil make the production first as the consumption will come. There is no need to look after the consumption, and as a seller you need not make forward contract, as the oil sells itself."[46]

THE GOVERNMENT—HELP OR HINDRANCE?

But this is not the whole story. What matters most is the difference between the attitude of 26, Broadway and of St. Helen's Court towards their respective governments. Again it is not a question of judgment but entirely one of circumstances, each of the two was absolutely right according to his lights and the "climate" in which he lived and operated.

The traditional hostility of the Federal Administration towards Standard Oil, reciprocated by the latter's calculated aloofness, was due to the response of public opinion to "trust capitalism," which, it was thought, tended to take rather than to give. However, countries haunted by the fear of oil starvation approved the man who knew how to provide it, and recognized him as the one who gave, never mind what he took for himself in the process. It was in this mood that Fisher talked of Deterding as being Napoleonic in his audacity and Cromwellian in his thoroughness.[47]

Until the first World War Standard Oil had little to expect from the Government—for them it was personified merely by the tax-gatherer and the Department of Justice enforcing the Sherman Act—but to the younger men off Bishopsgate and to a few like-minded operators, their Government was a very present help in trouble which afforded diplomatic "support," financial help, and that priceless moral backing which made the boldest ventures possible.

THE "AS IS" AGREEMENT

On these counts the superiority of what we may call the "Deterding School" is very apparent. It shows a more modern outlook than that of its senior rival. Realization of what really mattered, rather than all the alleged grandiose coups and little tricks of which so much has been made, has assisted the Royal Dutch to achieve near-parity with Standard in the international

field. The crowning success was marked by the famous though unpublished Achnacarry Agreement between Deterding and Teagle. In this peace pact the *status quo* was made the basis of a far-reaching understanding—it was called the "As Is" Agreement —and it meant in practice that Shell got away with its stupendous gains of the last twenty years by putting an end to the conflict[48] at the very time when she had little more to gain and a great deal to lose. I have always wondered whether Sir Henri could have weathered the storm of the great depression which followed 1929 if he had not, in the nick of time, composed his differences with his traditional rivals.[49]

There again is an instance of the Shell people's deep understanding of the necessity for, and of the implications of, co-operation between several groups operating in the same field. It is true that the amalgamation of refineries had been the "great plan" of Rockefeller, but, however well the owners of bought-up firms were treated, and however high some individuals may have risen in the hierarchy of the Trust, their companies were considered as conquered territory and were just swallowed up. The "merger" of Royal-Dutch and Shell interests in Asiatic Petroleum, however, and a great number of transactions thought out and carried through in the same vein proved Deterding's genius for seeking out complementary features in competing units and tying them together, and yet permitting all of them to remain on an equal footing.

Much later Deterding has described the "burning conviction" of his early days:—

> "There could be no real business health for anyone of us small Oil companies, unless we co-operated in certain directions, one with another, against the sledge-hammer tactics of our then chief opponent. I urged that some form of mutual agreement between us was all-essential: First, as to placing (when circumstances required it) the production, the transport and the selling of our Oil at definite agreed prices under one specified control; and, secondly, as to serving each market whenever practicable from the nearest source of supply. To my mind, those two points still comprise the first guiding principle of all successful Oil trading. Underlying them was the all-essential factor that we would cut out waste, if only I could bring our competitors to stand in with us. The waste, for instance, which was represented by the duplication of mining and refining plants, pipe-lines and the like, to say nothing of the duplication of transport systems, selling organizations and general administrations."[50]

If Rockefeller's system, however enlightened his methods, was an autocratic one, Deterding's ideas were, in a way, democratic. His group, formed by the co-operation of units of similar standing

rather than by one concern engulfing a great number of semi-victims, was the providential promoter of horizontal co-operation. They were after all not nurtured in the United States, with court actions hanging like a sword of Damocles just over their heads, but in an industrial climate where it was no offence for competitors to agree on points of procedure.

Incidentally, it is a matter of opinion whether the opportunity for a number of firms to join hands by allocating quotas is not simply a means towards obtaining the advantages of planned production without having to have recourse to a full-scale merger.

Making it illegal for ten firms to co-ordinate their activities may have a result not altogether in keeping with the trust-busters' desires. It sometimes leads to their coalescing altogether, voluntarily or by the weaker parties being driven out or bought up.[51] In a sense, cartels and trade associations are the middle-class versions of trusts.

Chapter 4

A NEW EQUILIBRIUM

MORE NEWCOMERS STILL

IN the international field the more recent history of the petroleum industry consists mainly of the rivalry between the American and the British. The U.S.S.R., at first the object of rivalry between the leading groups, played for a short period the role of biggest outsider, and eventually settled down to an attitude of studied aloofness, dictated by a rising home consumption, which left little oil available for export.

But what happened in the domestic field of the U.S.A., and was the almost complete monopoly of Standard Oil maintained? The principal event which ushered in the modern period of the American oil industry was the forced dissolution of the Standard Oil organization in 1911, which made itself felt in earnest only after 1918. It is interesting to speculate what might have happened if public opinion in the States had been less allergic to the concentration of industrial power in the hands of a few "czars". It is certain that the paramountcy of Standard would have been more accentuated than it actually was in the 'twenties and 'thirties, but there remains an element of doubt as to whether, legal difficulties quite apart, total control of the industry by one single unit *could* have been maintained. The plain truth is probably that the industry—based, as it was, no longer on lamp oil but on motor spirit and fuel oils—had become far too big to be handled by any one concern. It was inevitable that, in view of the swift and progressive increase of demand and almost equally rapid technical developments, opportunities arose for other enterprising groups to acquire a place in the sun.

It will be realized how conducive a rapidly increasing demand is to the advent of new suppliers—the existing producers will be less likely to put up a stiff fight for "their" share in the market when their own output is on the upgrade, anyway. It is always easier to capture part of additional demand than to squeeze oneself into a static, or, worse still, a shrinking market.

We find that after the last war "Standard Oil Interests," as they were then popularly, if somewhat inaccurately, called, were pre-

occupied internationally by the rising power of redoubtable rivals, and also by a considerable number of good-sized competitors at home. Making certain allowances for the particular legal set-up in the States, we see from then onwards the American scene becoming more and more like the oil industry in other countries as they are described earlier in this chapter. No longer is one firm in control of the whole industry, it is rather a group of autonomous, if like-minded, concerns which moulds the shape of things to come.

Should it, after the rapid rise of Shell, still be necessary to prove that the oil industry is *not* a "closed shop," the advent of a number of medium-sized firms who in due course achieved the rank of "Majors" should provide it.

The promotion, as it were, of concerns like Texas, Gulf, Cities Service, Sun or Phillips[52] testifies to the fact that, in the course of the last twenty years at least, there was no hard and fast monopoly, and that many a knapsack contained a Marshal's baton. Nevertheless, it can hardly be denied that this dynamic period was followed by one of consolidation, due *to the fact that those who managed to come out on top soon realized how much they had in common.* From this angle the issues on which they could not see eye to eye were of minor importance. Here again things developed along familiar lines: once more it was shown that when a competitor has managed to attain a certain standing, it is no longer politic to fight him. He has to be let in on the ground floor, where he will presently join forces to stave off common foes threatening from without.

A CHARMED CIRCLE

I am well aware that there are no hard and fast agreements between the top firms in the American oil industry, and far be it from me to take part in the discussion of this vexed question which has given rise to so much heated controversy in the States,[53] but it is quite obvious that public opinion was guided by a sure instinct when it assumed that *most of the super-firms acted as if there existed an understanding between them.*[54] If this undeniable unison is, as it may well be, achieved without clear-cut agreements, it is a still more cogent proof that such co-operation is, to all intents and purposes, inevitable.

The patent position is a case in point. With the advent of thermal cracking in the early 'twenties, patents became a major issue, and there was considerable friction among the supporters

of the several conflicting patent claims. It took the competing parties a number of years to discover that the knot was too complicated to be disentangled, and so they eventually agreed on pooling their patents and exploiting them jointly. Similar developments took place in transport and other spheres of common interest. From that time dates the conception that there is a considerable number, twenty or more,[55] of big firms forming a group of "Majors" who are bound to react in a similar fashion to the problems which confront them and will thus act along similar lines.[56]

Chassez le naturel il revient au galop—whatever we may do, the fundamental factors come to the surface: the oil industry, to exist at all, calls for concerted effort and, however often a co-operative structure may have been disturbed or broken up, it will soon begin to form again.

CONTROL-CUM-COMPETITION

Who, then, is on the right track? Those who stress the radically competitive character of the industry, pointing at the almost savage conduct of recurrent price wars, or those who maintain that the industry is under the sway of a monopolistic rule, naked and unashamed, or skilfully camouflaged, whichever may be the case?

Certainly there has always been competition, and sometimes of the most vicious kind; it is in these periods that the several units jockey for position. But the relevant fact is that all-out competition could only go to such lengths if it were of a temporary type. Those taking part in the game are wont to make sacrifices far beyond anything that conservative calculation of cost would justify, because *they are not fighting for their share in a free market, but for their quota in the combine which is to be formed eventually*.

On the other hand, those who would have it that the industry is all monopoly must realize that, even if the component parts of the industry seem to work hand in glove, there is always that very strong undercurrent of *potential* competition[57] which tends to qualify the behaviour of a monopoly. Not even the antagonists of the oil powers will accuse them of hampering technical progress or of failing to equip themselves with the most adequate tools for delivering the goods. This is not due to the public spirit of the officers of these firms—as a matter of fact, they are probably no better and no worse than their fellow oilmen—but is the result of

their considering any market against the background of competition, even if transactions are at a given time carried on in an "orderly manner".

Hobbes' definition of war as the absence of *real* peace fits the oil world admirably:—

> "The nature of Warre," he said, "consisteth not in actual fighting; but in the disposition thereto, during all the time there is no assurance to the contrary."

In the petroleum industry whose only constant is its changeability, nobody is allowed the luxury of resting on his laurels. However close co-operation among the participants of an "understanding" may be, every one of them will always keep an eye on the future and the standing of a member within such an organization depends on how well or how badly he would fare, should it break up.

It is therefore certainly unjustifiable to talk of "oil monopolies". What really happens is that certain units assume some sort of *leadership* in one or more sectors of the industry. They are the backbone—the hard core, if you like—of the industry; they set the standards of the day, whereas the pace of progress is often set by unruly elements, by smaller groups battling for a place in the sun.[58] Leadership carries considerable advantages, but they are obtained at a price, as we appreciated during our investigation of the relative position of Majors and Minors. In a way this set-up has so far provided what was required: production and refining and transportation on a large scale which have made for technical efficiency and for decreasing cost. The ensuing "monopoly" has been tempered by the competition of smaller units and by rivalry—actual or potential—among the major units themselves. Does past history and the present structure of the industry show that, *not being self-adjusting, it can adjust itself*, and that it can always solve its own problems? Can it achieve its own salvation in all circumstances, or do we need a policy *for* the industry?

NOTES AND REFERENCES

[1] Myron W. Watkins, *Oil: Stabilization or Conservation?* New York and London, 1937, p. 40.

[2] John Ise, *The U.S. Oil Policy*, New Haven, London, 1926, p. 274.

[3] Allan Nevins, *John D. Rockefeller: The Heroic Age of American Enterprise*, New York, 1940, Vol. I, p. 278.

[4] In the 'sixties and 'seventies crude production was confined to a small area, and agreement of the men of the "region" directly influenced the price. When crude oil came to be produced in several widely separated areas supplying identical or adjacent markets the problem became altogether unmanage-

able unless tackled on a nation-wide basis. This, however, was patently impossible, if the consent of all or almost all producers was required. As Nevins puts it in his book on *John D. Rockefeller*, Vol. I, p. 430:—

> "Oil production was never controlled in the United States until the Federal Government undertook the task—and then not for long."

(5) Ida M. Tarbell, *The History of the Standard Oil Company*, London, 1905, Vol. II, p. 157.

(6) I do not know what the comparative figures were then, but in 1936 there were in the U.S.A. 2,450 producers and only 570 refiners. (William J. Kemnitzer, *Rebirth of Monopoly: A critical analysis of economic conduct in the petroleum industry of the U.S.*, New York and London, 1938, pp. 38 *et seq.*) A recent survey compiled by Socony-Vacuum Oil Co. Inc., published in *National Petroleum News*, September 26th, 1945, referred to "10,000 substantial oil and gas producers and about 350 refiners."

(7) Nevins, op. cit., Vol. I, p. 211, said of these early days:—

> "Most readers of Lloyd and Tarbell later thought of the industry as involving heavy investments. But essentially the process was merely one of cooking combined with purification by a few chemicals; some vats, stills, and pipes sufficed. Any man with $10,000 could establish a small refinery, any one with $50,000 a large one."

Occasionally, however, some of these limiting factors obtained and there arose opportunities for controlling rigidly some specialized markets which provided bottlenecks of their own. The White Oil Makers' Association (WOMA), which for many years exercised almost complete control over the European markets for white oils and transformer oils, is a case in point. Its effectiveness was mainly due to one type of raw material (Russian Solar Oil) being particularly suitable. The only suppliers of Solar Oil were a party to a small cartel of refiners whose tenure was safeguarded by the fact that refining of these special oils required much skill and know-how. Restrictive arrangements of the WOMA type flourish occasionally behind the shelter of custom tariffs and of arbitrary specification standards.

(8) Gilbert Holland Montague, *The Rise and Progress of the Standard Oil Company*, New York and London, 1904, p. 13.

(9) G. H. Montague, op. cit, p. v.

(10) Vice-President Wallace, in a speech delivered in Dallas (Texas) on October 20th, 1943 (quoted in Platt's *Oilgram*, Vol. 21, No. 206), said that "monopoly control of transportation breeds monopoly in other industries". This is an irrefutable statement, and is borne out by the history of the oil industry. My point made on pp. 72 and 73 that monopoly in one industry can be the result of all-out competition in another is, however, equally correct. That "cartelization" is the final outcome in either case is something worth pondering.

(11) Ida M. Tarbell, op. cit., Vol. I, pp. 54 *et seq.* A more recent account of this venture indicates another of its aspects. Nevins, in his book on *John D. Rockefeller*, Vol. I, pp. 321 *et seq.*, says:—

> "An outline of the scheme will make clear both its strength and weakness. It was essentially a plan to unite the oil-carrying railroads in a pool; to unite the refiners in an association, the South Improvement Company; and to tie the two elements together by agreements which would stop destructive price-cutting and restore freight charges to a profitable level. The railroads were to divide the oil-freights by a pre-arranged scale; the refiners were to act as *eveners*, insuring each road its proper share of the business from consigners; and in return the refiners were to get rate concessions which would wipe out all recalcitrant competitors."

(12) G. H. Montague, op. cit., p. 8.

[13] Allan Nevins, op. cit., Vol. I, p. 387.

[14] It now appears that many of the stories of refiners being forced to sell for a pittance were sensational trash for which even so shrewd an observer as Miss Tarbell fell, the much laboured story of the widow Backus being particularly notable. It is well to remember that almost all those who sold out had the option to take Standard stock, and whoever did so was, of course, much better off in the end than he could ever have hoped to be had he carried on in his own small way, the reason being that his "share" was worth more once it was a part of an efficient organization. The frame of mind of bigger competitors who joined Rockefeller at a later date and became his closest associates is described by Nevins, op. cit., Vol. I, p. 518, as follows:—

> "Men like Warden, Archbold, Lockhart, and Pratt, all too well versed in the dizzy fluctuations, unforeseen crises, ruthless competition, and dismaying losses of the business, saw that Standard was stable and prosperous. This was partly because its size commanded discriminatory advantages,, but more largely because of the economies wrought by large-scale operations, internal efficiency and shrewd leadership."

[15] To this very day the outcome of the first pipe-line affair rankles. In Mr. Wallace's 1943 speech, quoted above under [10], one can find the following passages:—

> "It is an irony of history that the first pipelines were built by independent producers attempting to escape the domination of the railroads by the oil monopoly. But the people, not only of Texas but of the nation, know what happened to the pipelines. Instead of having equal access to the pipe lines facilities, they discovered that it was the major oil companies who owned and operated this vital artery."

[16] Nevins, op. cit., Vol. I, p. 485.

[17] Nevins, op. cit., Vol. I, pp. 575 *et seq.*

[18] *Investigation of Concentration of Economic Power*, T.N.E.C. Monograph No. 39–A; "Review and Criticism on Behalf of Standard Oil Co. (New Jersey) and Sun Oil Co. of Monograph No. 39, with Rejoinder by Monograph Author," Washington, 1941, p. 14.

[19] G. H. Montague, op. cit., p. 13.

[20] *Report of the Commissioner of Corporations on the Petroleum Industry*, Part I; "Position of the Standard Oil Company in the Petroleum Industry," Washington, 1907, pp. xv. *et seq.*

[21] Ida M. Tarbell, op. cit., Vol. II, p. 226.

[22] John Ise, op. cit., pp. 49 *et seq.*

[23] Nevins, op. cit., Vol. I, p. 309.

[24] *Petroleum-Industry Hearings Before the T.N.E.C.*, New York, 1942, p. 538.

[25] *Oil for the World*, a pamphlet published 1944 by Standard Oil Co. (New Jersey).

[26] *The Index* (quarterly bulletin of The New York Trust Company), Vol. XXIV, No. 2, Summer, 1944. The survey goes on to say:—

> "In general, industries which concentrate on quality, or are dependent on fashion, are not subject to easy cartelization."

This is the reason why gasoline lends itself easily to cartel arrangements, whereas lubricating oil with its high specialization and its peculiar buying habits is the least likely to be "regulated".

[27] Ida M. Tarbell, op. cit., Vol. II, p. 226. The "never" need perhaps not be accepted at its face value, although the statement itself is genuine enough. Ida Tarbell, in describing the set-up of the 'eighties, wrote:—

> "This third corner of the oil market seems to have convinced Mr. Rockefeller and his colleagues at last that, however great the fun and

profits of making oil very dear, in the long run it does not pay; that it weakens markets and stimulates competition. They learned a lesson in these years they have never forgotten—that when you make a scoop it must not be so big that you will never have a chance to make another one; that if you want to keep your power to manipulate the market you must use that power so modestly that the public in general will not, realize you have it. . . . Benjamin Brewster once said to a Federal Investigating Committee, which had asked if the Standard could not fix the price of oil as it wished: 'At the moment many things may be done, but the reaction is like a relapse of typhoid fever. The Standard Oil Company can never afford to sell goods dear.' . . . The after-effects of the first great raids were salutary. The Standard learned the limitations set on monopolies by certain great economic laws". (Vol. II, p. 206.)

All these considerations are still valid and are scrupulously observed by all enlightened combines.

[28] If proof was wanted for the statement that "control" of the industry, as we have known it, did not make for high prices, it would be provided by Ise's lament over low prices for oil:—

"Oil prices have always been far too low. Even in periods of what were called prosperity for the industry, oil has been much too cheap. Low prices have been and still are a constant and irresistible invitation to waste." (John Ise, op. cit., p. 494.)

This leads to the question whether competition has not been too fierce after all, and whether a higher degree of control of the use of an irreplaceable resource was not called for (see below, pp. 133 *et seq.*).

[29] John Ise, op. cit., p. 123.

[30] Quoted from *The Derrick* by Nevins, op. cit., Vol. I, p. 424.

[31] See Appendix II, p. 160, for the role of the "marginal" shipper in the tanker market. The main features are identical in both cases.

[32] This does not, of course, mean that a marketer who has the command of an elaborate selling organization needs to sell at exactly the same price as some small garage. On this subject see p. 64. However, since motor spirit prices are very much in the eye of the public, it would be difficult to stick for any length of time to high prices in the face of *much* lower quotations by independents.

[33] All these facts are widely appreciated in Europe, and they are sometimes recognized even in the States, though not usually in such straightforward manner as in the following statement of an executive of an organization of Independents, called Atlantic Coast Oil Conference Inc. (I don't know, however, to what extent this is a genuine independent organization.) This statement, as quoted in *National Petroleum News*, July 12th, 1944, contains the following passages:—

"First, it seems to me, we must carefully assess our relationship with big business that we live in the same house with. It has long been a popular method on the part of independents to build up the class angle and set one group against the other. . . . Some common sense seems called for. Exaggerated self-interest and short-sighted policy has been as often found in minor oil circles as in major, and plain blundering is not alone a major characteristic. . . . Would we, if we could, abolish the majors? If we did, would there long remain the technical developments we boast of as an industry, the miracles of science that have given us a low-priced product to market, and the keen competition in actual marketing that has made the industry great? We want the fruits of large-scale operation in production, refining, transportation, and marketing. Let's not spout nonsense about breaking up the large business organizations that make

these fruits possible. Our healthy functioning as small businessmen is tied up with the prosperity and well-being of the large integrated organizations."

(34) The standard set by a major company may be beneficial to its competitors even beyond the range of controlled markets. Motor oil has always been sold in a competitive market, but the fact that, e.g. the Vacuum Oil Company had initiated a world-wide policy of good quality high price oils, sold through an elaborate organization of great technical efficiency, has somehow helped independents to find their own level. The high price of "Gargoyle," for instance, has made it possible for unbranded oils to be marketed at a price which certain categories of buyers appreciated as being highly advantageous. The Vacuum policy has also provided the pattern of technically sound salesmanship which could, up to a point, be adopted by the more progressive among the smaller firms. A great number of brands have been established whose success was still due to the senior competitor maintaining a high price level, thus upholding the idea that it was worth paying a good price for a suitable oil. (For a note on the price structure of lubricants, see above, pp. 53 *et seq.*)

(35) *National Petroleum News*, December 27th, 1944, p. 20.

(36) Even in the lubricating oil markets which, by reason of their diversity, are less often subject to hard and fast rules and regulations, we find the tendency of the leading firms to co-operate with some of their smaller competitors. In return the latter confine themselves to a certain class of business and generally "play the game" as His Majesty's Opposition. The very moment they overstep their limits, however, heavy pressure is brought to bear upon them.

(37) Lionel Robbins, *Economic Planning and International Order*, London, 1937, p. 116.

(38) Some useful information can be found in Glyn Roberts, although one has to bear in mind that the author is biassed against Deterding. Most of the politico-historical books on oil in the selected bibliography on pp. 165 *et seq.* contain parts of Sir Henri's history.

(39) Sir Henri Deterding, *An International Oilman: As Told to Stanley Naylor*, London, 1934.

(40) It will be remembered that the original "Shell" Company was mainly a transport undertaking which later joined hands with the producing company, the Royal Dutch. Even now the full style of one of the principal group members is: "Shell Transport and Trading Company Ltd."

(41) Quoted by Ludwell Denny in *We Fight for Oil*, New York and London, 1928, p. 33.

(42) Sir Henri Deterding, op. cit., p. 50.

(43) Sir Henri Deterding, op. cit., p. 51.

(44) John Ise, op. cit., pp. 239 *et seq.*

(45) The same applies *a fortiori* to Persia and the whole oil region of the Middle East. The particular role played by the Anglo-Persian (now Anglo-Iranian) Oil Company within the framework of British government policy will be dealt with in the concluding chapter.

(46) Lord Fisher, *Records*, London, 1919, p. 202.

(47) Lord Fisher, op. cit., p. 201.

(48) The use of the word "conflict" in this connection does not mean that there had raged a continuous trade war up to that time; it is, however, correct to say that the period between that agreement and the outbreak of this war showed the participants in an almost complete unity of purpose which had never before been achieved.

[49] It is an interesting fact—in view of what Deterding had said in support of the idea of a complete "straight line" policy (see above, p. 90)—that Royal Dutch, heavily involved in crude production, fared rather worse in the depression years than New Jersey, still a big buyer of crude.

[50] Sir Henri Deterding, op. cit., pp. 68 *et seq.*

[51] I should not be surprised if the conception were to gain ground that some sort of trade associations which make it possible for smaller units to survive are the lesser evil as compared with a state of affairs in which the fittest survives and *one* group emerges as a monopolist. It is very true that the drawback of such associations is their tendency to shelter inefficiency and thus to increase cost, but almost the same may happen if mammoth firms become over-capitalized in the process of "mopping up resistance".

[52] See R. B. S. Shuman, *The Petroleum Industry*, Oklahoma, 1940, p. 10.

[53] See, amongst others, *Investigation of Concentration of Economic Power*, T.N.E.C. Monograph No. 39; "Control of the Petroleum Industry by Major Oil Companies," Washington, 1941, and Monograph No. 39–A; "Review and Criticism on Behalf of Standard Oil Co. (New Jersey) and Sun Oil Co. of Monograph No. 39 with Rejoinder by Monograph Author," Washington, 1941.

[54] Though it is certainly no European's business to comment upon the peculiarities of the American set-up, I may perhaps suggest that in the U.S.A. competition on the highest level is not quite as hot as it is sometimes represented, whereas, as we shall see presently, the much decried European cartels are not as stiff as the Americans take them to be. This will perhaps help to cheer up Mr. W. C. Platt, who had apparently one day during his trip to the European theatre of war a violent attack of homesickness, and cabled to his paper that "constructive and profitable competition" *à l'Américaine* was in Europe "unknown where, sad to relate, it may never be known". (*National Petroleum News*, January 10th, 1945.)

[55] According to *Petroleum-Industry Hearings Before the Temporary National Economic Committee*, New York, 1942, p. 31:—

> "The '20 major integrated oil companies' appear to be the fully integrated companies which had the largest total assets on December 31, 1938. Their names, arranged in the order of their total assets, are:—
>
> (1) Standard Oil Company (New Jersey).
> (2) Socony-Vacuum Oil Company, Inc.
> (3) Standard Oil Company (Indiana).
> (4) The Texas Corporation.
> (5) Standard Oil Company of California.
> (6) Gulf Oil Corporation.
> (7) Cities Service Company.
> (8) Shell Union Oil Corporation.
> (9) Consolidated Oil Corporation.
> (10) Phillips Petroleum Company.
> (11) Tide Water Associated Oil Company.
> (12) The Atlantic Refining Company.
> (13) The Pure Oil Company.
> (14) Union Oil Company of California.
> (15) Sun Oil Company.
> (16) The Ohio Oil Company.
> (17) Continental Oil Company.
> (18) The Standard Oil Company (Ohio).
> (19) Mid-Continent Petroleum Corporation.
> (20) Skelly Oil Company."

The relative importance of "major" companies is to be seen from figures submitted to the T.N.E.C. by Professor Ise

> "showing the percentage of the physical facilities and operations of the industry which the '20 major integrated companies' owned or conducted:

Branch of Industry	Number of Companies	Per cent.
1. Total investment (12.31.38)	20	66.7
2. Producing oil wells (12.30.37)	20	23.7
3. Crude oil production (1937)	20	52.5
4. Crude oil gathering pipe-line mileage (6.30.36)	20	57.4
5. Crude oil trunk pipe-line mileage (6.30.36)	14	89.0
6. Crude oil pipe-line mileage (6.30.36)	20	72.0
7. Investment in pipe-lines (12.31.38)	15	77.4
8. Pipe-line operating income (1938)	15	86.4
9. Deadweight tonnage of tankers (9.30.38)	15	87.2
10. Stocks of refinable crude oil (12.31.37)	20	96.5
11. Daily crude-oil capacity (1.1.38)	20	75.6
12. Daily cracking capacity (1.1.38)	20	85.2
13. Crude-oil runs to stills (1937)	20	82.6
14. Production of gasoline (1937)	20	83.8
15. Stocks of finished gasoline (12.31.37)	20	90.0
16. Stocks of lubricants (12.31.37)	20	93.0
17. Six selected stocks figures (12.31.37)	20	94.2
18. Gasoline pipe-line mileage (1.1.38)	16	96.1
19. Domestic sales of gasoline (1938)	18	80.0 "

[56] There exists considerable American literature on the extent of monopolistic control of the several key industries in the U.S.A. (see T.N.E.C. Monographs, mainly No. 1, Saul Nelson, V. G. Keim under E. I. Mason, *Price Behaviour and Business Policy*, Washington, 1941; and No. 21, Clair Wilcox, *Competition and Monopoly in American Industry*, Washington, 1941), and the expressive if ugly word "oligopoly" has been coined. It covers a monopoly held jointly by a number of firms and the oil industry is a foremost example. The argument as to whether other industries are not to a still higher degree under the sway of an "inner ring" is futile as long as the structure of the respective industries is not taken into account.

Dorsey Hager's argument, for instance, that

> "the oil industry is certainly not held in the tight grasp of a few concerns as is mining, where the Anaconda, the American Mining and Smelting Company, the Phelps-Dodge, and the United States Smelting and Mining Company dominate the field" (Dorsey Hager, *Fundamentals of the Petroleum Industry*, New York and London, 1939, p. 45),

somehow misses the point. None of the mining companies control the manufacture or the marketing of the finished products to the ultimate consumer. Petroleum, however, is to-day "controlled" by a few groups in its entirety, i.e. from the well to the petrol pump.

[57] Potential competition is a relevant factor in many industries. In *Studies in the Economics of Overhead Costs* (Chicago, 1923), J. Maurice Clark said that it

> "refers to restraint exercised by the knowledge that attempts to be too grasping will precipitate competition which is not at present active".

And later on he made a specific statement which bears out my reference to the control of prices by smaller competitors (see above, p. 84); he referred

particularly to potential competition from people who have not yet entered the trade. He said that

> "the effect of potential competition is quite satisfactory where it depends on the relatively unobtrusive entrance of small and medium-sized producers, no one of whom is of sufficient importance to provoke a price war" (pp. 446 *et seq.*).

[58] This relation of smaller firms to the biggest in their industry—not confined to petroleum—has once been vividly described in *Fortune*. There one could read that

> "certain small concerns are important, more important than the giants because their condition calls forth the phenomena of service and ingenuity. While the giants are sitting on inventions and coddling markets, these people encourage inventions and develop new markets."

PART V

POLICIES FOR THE INDUSTRY

SO far I have indicated some of the basic factors in the oil industry, and I have endeavoured to trace its history as a function of these factors. It remains only to investigate how the industry, as we know it, can be made to fit into what is likely to be the general pattern of economic life in the near future. I do not want to preach what we *ought* to do about oil, there each of us is entitled to his own opinion; rather I limit my purpose to the demonstration of what *can* and what *cannot* be done about it.

Chapter 1

PATTERNS FOR OIL PEACE

THE literature on international oil affairs—and there is no lack of it—does not really deal with petroleum. Either it consists of more or less accomplished disquisitions on the game's protagonists, based rather on fiction than on facts, or it is straight political argument. This is no one's fault, but it does reflect the fact that, contrary to popular opinion, oil affairs are not the *fons et origo* of what is going on, they are but one of the manifestations of the course things have taken.

Until about 1910 oil was not a front-page political issue, but from the last war onwards it was so important that it became an immediate concern of most governments. It is true that men like Deterding and Lord Cowdray actually led the field, but such influence as they wielded was in the end due rather to their proving acceptable exponents of their countries' interests than to their control of big commercial groups. It has often been represented that much of the progress of crude production in the Carribean and the Middle East was due to the activities of individual pioneers. This certainly was the case, but what gave these efforts their particular significance was the support of the Powers. The profit motive is an inducement which must not be underrated, but it remains a subsidiary factor throughout.

AMPHIBIA

The history and, incidentally, the success of the Anglo-Persian (now Anglo-Iranian) Oil Company is a perfect example of the dual role a big oil concern can, or rather has to, play in our times. It is instructive if only we are able to distinguish between essentials, which the several types of oil companies have in common, and formal set-up, in which they differ. For, while Anglo-Persian was partly state-owned and carried on business in the manner of a commercial corporation, there was, at the same time, more than one privately-owned group which saw fit to act as if it were government controlled. In fact, the difference between the two types of undertaking is much smaller than would at first appear to the layman.

The full history of "Anglo-Persian" has yet to be written. It will be of considerable interest, apart from the back-stage story of how d'Arcy's concession reached its final destination, because it must certainly contain an object lesson in the possibilities—limited though they may be—of state and private enterprise working side by side. What interests us here and now, however, are the motives that caused the British Admiralty to take a step as unorthodox as the acquisition of a struggling oil company and its development into a first-class industrial proposition. The whole transaction bears the unmistakable features of Churchillian improvisation and was carried out with that blend of determination and gentleness which, to the outside world, has for a long time been the hall-mark of important moves by the British.

CHURCHILL ON ANGLO-PERSIAN

The Admiralty, faced with the necessity of relying on liquid fuel for its warships, was worried because its supply was not as safe as that of home-produced coal, and it was Winston Churchill himself, as First Lord of the Admiralty, who described in his statement to the House of Commons, made on July 17th, 1913, the conclusions to which they had come and the policy they had agreed upon:—

> "It is a twofold policy. There is an ultimate policy and there is an interim policy. Our ultimate policy is that the Admiralty should become the independent owner and producer of its own supplies of liquid fuel, first, by building up an oil reserve in this country sufficient to make us safe in war and able to override price fluctuations in peace; secondly, by acquiring the power to deal in crude oils as they come cheaply into the market. . . . This second aspect of our ultimate policy involves the Admiralty being able to refine, retort, or distil crude oil of various kinds, until it reaches the quality required for naval use. This again leads us into having to dispose of the surplus production—another great problem—but I do not myself see any reason why we should shrink if necessary from entering this field of State enterprise. We are already making our own cordite, which is a most complex and difficult operation . . . and I see no reason, nor do my advisers, why we should shrink from making this further extension of the vast and various businesses of the Admiralty. The third aspect of the ultimate policy is that *we must become the owners, or at any rate the controllers at the source*, of at least a proportion of the supply of natural oil which we require. On all these lines we are advancing rapidly."[1]

Here we have the whole problem in a nutshell: the government of a country which has no crude of its own enters the ranks of oil producers and refiners, not because it believes in state ownership, but because it has no alternative. It cannot afford to rely on the traditional commercial machinery, controlled to a great

extent by foreigners, for its most vital supplies.[2] From that time, with one great power's cards on the table, *all* international petroleum developments are found to have lost their private character.

At first people failed to understand the change that had taken place. In L. Denny's book, *We Fight for Oil*, the following story is recounted:—

> "When the British Foreign Office sent Sir William Tyrrell to Secretary of State Bryan, to lessen the tension over Mexico, the latter told Sir William: 'The Foreign Office had simply handed its Mexican oil policy over to the oil barons for predatory purposes.' The British diplomat replied: 'Mr. Secretary, you are talking just like a Standard Oil man . . . you are pursuing the policy which they have decided on.' "[3]

Did it not occur to these statesmen that it may have been the other way round, not only on the British but even on the American side, or was it that they preferred to hide behind their oil interests?

THE DOG AND ITS TAIL

Foreign activities of American oil firms might not have been the concern of Washington as long as they were, for all intents and purposes, confined to marketing, but in the early 'twenties the spectre of an oil shortage in the U.S.A. had already raised its ugly head and, however much the opposite may seem to be true, there is little doubt that some sort of co-operation existed between the oil interests and the State Department.[4] To assume that this was not so would be to underrate the intelligence and the responsibility of either side. Professions to the contrary only go to show that the Americans have now adopted the traditional British claim of coming by the Empire in a state of absent-mindedness.

This is a matter which goes much deeper than the late and unlamented Dollar Diplomacy, more honour'd in the breach than the observance. It is not so much a problem of protecting the property of United States citizens as the safeguarding of the vital interests of the United States. However much the spokesmen of the American petroleum industry may publicize their desire "to keep the government out of the oil business", they cannot escape history. They cannot deny that the Administration must make sure of potential supplies in case of an emergency, nor that the industry stands in need of what is, by way of a curious understatement, called "diplomatic support". Do the oil interests really believe that the Government—that is to say, their fellow-countrymen at large—will see them through in whatever they elect to do abroad, without first acquainting themselves with the layout of the enter-

prise? Does business really expect the Government to endorse a blank cheque? Do they honestly think foreigners such simpletons as to prefer "private American enterprise" to state-controlled undertakings when, at the same time, these very oil companies are emphasizing the urgency of vigorous support from Washington?[5] Shorn of all embellishments, which have been designed for tactical purposes only, the relation of state and industry in respect of foreign operations is extremely simple: the oil people are dealing as agents for a principal who has elected to pay them commission on a generous scale. Not long ago Dr. James Landis, a high-ranking United States official concerned with Middle East affairs, said that the situation in that area "points not only to normal competition, but to competition along international lines with nationals who own oil as instruments of foreign policy". To lay the blame for international unrest at the door of the industry is to confuse the hounds with the huntsmen.[6]

TWILIGHT OF THE GODS

I am not trying to propitiate the Majors by shifting responsibility to other agencies. In fact, the upshot of these developments is anything but pleasing to them. It is part of a general progression during which they have lost much of their old power, and if things continue in the same direction they may be deprived of their very *raison d'être*.

The change of their status has been reflected in the type of men, so different from their predecessors, who have in recent years come to the top of their organizations. Teagle, Farish, Gallagher on the one hand, De Kok, Agnew, Godber, and the sons and heirs, "young" Kessler and the second Viscount Bearsted on the other, stepped into the rather too large shoes of Rockefeller and Archbold, of Deterding and Samuel. This is an age of able administrators, of men who know how to negotiate a contract, not of leaders and pioneers.

The wheel has turned full circle. Deterding's conception that you have to be in with the government if you want the government to work for you has proved almost too successful.

Any government required to shoulder responsibilities will sooner or later claim its rights as well. This being so it is not surprising that the official delegations to the Anglo-American oil conference, held in Washington in the summer of 1944, consisted exclusively of politicians and civil servants while the oil people were confined to talks on a "technical level".

By way of consolation to oilmen, smarting under this blow, there is the fact that the expert does not always get the clearest overall picture of an involved problem; it was no less a man than Henry Ford who said he would never employ experts for a new venture, they were too aware of the difficulties. After all, the great men in our industry did not start as producers, as refiners, nor even, if the word is admissible, as oil marketeers: the famous "Colonel" Drake, the first American to strike oil in quantities, had never before been connected with drilling: he had been a conductor on the New York and New Haven Railroad. Rockefeller began as a commission produce agent and Deterding as a bank clerk. In fact, with apologies to Clemenceau and the generals, oil is too serious an affair to be left to oilmen.

But the change in status is not confined to personnel. In the "heroic" age of petroleum politics, the big oil groups were still considered to be autonomous, even sovereign, powers whoever may have been ultimately responsible for their policies. Like the Elizabethan privateers, they were allowed to carry on their campaigns provided that they kept within the bounds set by power politics. They have been, after all, a convenient means of getting hold or rid of oil, and they may continue in that role as long as there is no international oil peace as part and parcel of some general settlement on the highest level.

GRAND DESIGN

A genuine international oil agreement of this sort would relieve the Majors of their most vital, if least publicized, function. *They have, during the last ten or fifteen years, been the great "eveners" of oil production and distribution.* Their almost complete hold on such critical producing fields as those of Venezuela, Persia and Iraq made it possible for them to open up and shut down production according to market requirements.[7] Only groups with world-wide interests and command of proportionate resources could, for instance, afford to bottle up the Iraq production for so many years. Here we see, though on a different level, the exact replica of the attitude of major firms to the problems of a domestic market as it was depicted in the preceding chapter. The largest operator is, more than anyone else, interested in comparative stability, and he will always be prepared to pay for what he thrives on. It is not difficult to appreciate what would have happened to oil markets in general, if the potential production of the Middle East had been unloaded on world markets in the

early 'thirties. This is probably the greatest service the major groups—who were all shareholders of the "Iraq Petroleum"—have rendered to the industry at large.[8]

The same oil which would have been a nuisance in, say, 1935 was a boon to the Allies in 1941. But you have to be a Pharaoh to be able to provide for the seven years of famine during the years of plenty, and only a very big organization could have "conserved" oil on this scale until it was needed.

The benefits of such world-wide co-operation were inevitably reaped by countries with less unified production methods, i.e. by the United States and Roumania, and made it possible to advocate and to carry out proration in the U.S.A. There was certainly no agreement negotiated with this explicit purpose, but, if we try to visualize the general lay-out of forces and interests, we shall see that the comparative peace of the decade before 1939 resulted from a number of nicely balanced *quid pro quos*. I am not trying to unmask a sinister plot of big business against humanity; I believe it is quite the other way round. It is, perhaps, an example of international planning of the highest order and, if there is any criticism to make, it is that there was undue secrecy surrounding the master plan. As far as I know, only bits and pieces of it have been discussed in public, and nobody has yet compiled a coherent résumé. The period of oil war has been described in several books,[9] but apparently peace is not "news". I hope that I shall go some way to showing that this particular peace is more exciting than all the frequently discussed conflicts.

EQUATION OF COST

The basic problem of the era under review—it has not yet ended—is the difference in production methods and production cost between the U.S.A. and the newer oil regions. In the U.S.A. from 1857 to 1940 was produced about 63 per cent. of world output, and its share was, in 1940, still of more or less the same order.[10] Its production costs are determined by the high level of its wage bill and the structure of its producing industry, which necessitates the bringing down of a relatively large number of wells. These facts and the high ratio of wells and fields which have passed the prime of their productive life has brought the average daily yield per well in the U.S.A. down to 1½ tons[11] as compared with 3 tons which, if the figures on record are reliable, appears to be the corresponding average outside the U.S.A.[12]

I cannot go into details here and now, but it may be safely as-

sumed that the average actual cost of producing crude in the Middle East is less than half that in the United States; costs in Venezuela and Colombia should be hardly higher than those in the Persian Gulf area. Had the interests controlling these fields wanted to carry on all-out competition amongst themselves and against United States producers, oil prices outside the U.S.A. would have dropped far below the established "Gulf" standard and U.S.A. export with the possible exception of specialities, would have come to an end.[13] It is true that the U.S.A. could have settled down behind a tariff barrier still higher than that erected in 1932,[14] but it was apparently found preferable to come to terms with the few groups controlling production in Central America with a view to limiting their oil imports into the States to a certain figure, and to establishing a *modus vivendi* with competitors in foreign markets. This informal agreement with the main producers in the Western hemisphere—outside the U.S.A.—was the relevant factor, although it might never have been concluded, had not the purely U.S.A. interests been able to brandish the tariff weapon.[15]

A policy of basing world market prices on "Gulf of Mexico" quotations appears to have been generally accepted, and was completely rational after the U.S.S.R. dropped out of the picture, since the Gulf was the main source of supply [16] for independent importers in consuming countries.[17] Taking into account both the low actual production cost in the outlying oilfields and Deterding's famous "straight line" transport policy, the return obtained for supplies of Middle East and some other crudes must have been highly advantageous, and might have been even more so but for the sacrifices involved in the policy of super-conservation in several fields.

"ADJUSTMENT IN PRICES"

There is very little published evidence to show the details of such a "price schedule", as there was strictly speaking no "market price" for Venezuelan or Persian oil, but one can glean some of its relevant features from a report of the British Auditor General on *Adjustment in Prices of Bunker Oil Supplies*,[18] part of which reads as follows:—

> "Before the war the price of oil f.o.b. in the Gulf of Mexico was the generally accepted basis regulating the prices of commercial supplies of oil in the Atlantic area. It also influenced, under competitive conditions, prices in other areas.

> "In the course of their enquiries the Committee found that in many cases the price of bunker oils charged or proposed to be charged to the Ministry at ports in the Indian Ocean and Middle East included an element described as an origin differential. This differential (which did not represent actual costs incurred by suppliers, and which applied to all oil products, and not solely to bunker fuels) was a means of equating c.i.f. prices, whatever the point of production. The general result was that, when the source of supply was more distant than the Gulf, the application of the differential would operate to the disadvantage of the supplier and, when it was nearer, to his advantage.
>
> "The Committee took the view that this item should not be accepted as an element in bunker prices, and the oil companies were asked to furnish particulars of their actual f.o.b. returns for bunker oils for the period immediately preceding the outbreak of war.
>
> "This information the companies were unable to produce, and it was eventually agreed, as explained below, to accept in the Persian Gulf the f.o.b. prices prevailing in the United States ports in the Gulf of Mexico."

There we have all the paraphernalia of a fully-fledged system of regional prices, based on the somewhat theoretical Gulf quotation; obviously the "equating of c.i.f. prices" will, in times of peace, have generally operated in favour of the supplier from sources other than the Gulf, and the equation of f.o.b. instead of c.i.f. prices must have been a heavy blow to the original conception of a regulated market. However, it is still, in view of comparative production costs, very satisfactory to be paid an f.o.b. Gulf price for, say, Persian oil f.o.b. Abadan.

The operative passage of the official British statement, which goes far beyond problems of freight, is its reference to a price build-up "which did not represent actual costs incurred by suppliers." *The method of "equating c.i.f. prices whatever the point of production" appears to be the result of the general settlement outlined above.*

INTERNATIONAL ASPECT OF PRORATION

There can be but little doubt that the American counterparts of this international set-up were "conservation" and "proration", as we knew them in the 'thirties. I do not see in the idea of limiting competitive drilling a sinister attempt of the Majors to kill off the Independents, although it may, in the first instance, have made the latters' life difficult, but no unbiassed observer need deny what Farish himself admitted without qualms, namely, that conservation suited the Majors' book very well.[19]

The Majors are, as we have seen over and over again, always eager for a certain stability of the market. In this particular instance they want it even more than usual, because they know that sudden outbursts of flush production create circumstances

which favour the mushroom growth of smaller refineries near the fields which get their chance whenever and wherever local over-production brings some crude prices down to a level below the national average. But this is only by the way, the impact of pro-ration upon competitive positions in the domestic market is probably not the only important feature of conservation policy. What mattered most, apart from the aspect of technology, where sound argument seemed to support it, was the fact that only with a certain degree of production control could the United States be fitted into the world-wide structure of the oil industry. Conservation was the missing link which had to be forged.

We have seen that the United States price level—that of a high-cost producer[20]—was maintained with the assistance, the collusion if you like, of low-cost producers who, at the same time acted in accordance with their own interest. They themselves were deeply involved on the American side, and could hardly be expected to allow their foreign interests to interfere materially with their policies in the United States, but it is, on the other hand, pretty certain that the whole structure would have been thrown out of balance had the Americans, say in 1936, seen fit to step up production unduly. That they were technically in a position to do so, has been amply proved by their achievements during the war. The *sine qua non* of a satisfactory price level was, however, a reasonable control of output *everywhere*.[21] The spokesmen of independent producers, who flew into a rage at the very thought of the curtailment of their production, refused to appreciate that, failing an international understanding, their output would have been "prorated" with the bulk of the Independents forced out of business by crude sold over a long period at, say, 50 cents per barrel. True, supply is inelastic for ordinary price fluctuations, but there exists a certain breaking point at which the whole edifice collapses.

Consequently, the structure of American oil prices was a very peculiar one: those who maintained that, apart from the incidence of proration, prices were allowed to find their own level in the course of competitive transactions were right up to a point, but they overlooked or neglected the fact that *there was an invisible hedge round the American market, formed by the deliberate policy of big foreign producers.*

As long as the U.S.A. cared to export a sizeable part of its production, its domestic market was irrevocably tied to the Gulf price level. Domestic prices could only be substantially higher

than export quotations if there was an elaborate system of control over exports and of allocation for the domestic market.[22] The informal system as eventually established was, though by no means foolproof, far more palatable to all concerned.

Have the oilmen who worked with patience and determination to erect the comprehensive, world-wide structure done wrong? Has their work been prejudicial to the interests of humanity? The answer will probably be similar to the appraisal of Standard Oil's role in the early days; now, on the international level, it may still be provided by what Ise had to say about Rockefeller:—

> "The Standard Oil monopoly represents to some extent the handiwork of selfish and unscrupulous men, but to some extent it represented a natural economic evolution."[23]

A FAIR PRICE FOR OIL

Had there been no international "understanding", oil prices would almost certainly have been lower than they were—but is that really a consumation devoutly to be wished? We know only too well that in view of transport cost and taxation (see above, Part II, Chapter 2, and Part III) the price of petroleum products at the refinery is only a fraction of what the consumer has to pay and, furthermore, it is always questionable whether low oil prices are at all beneficial in the long run.

It is true that cheap oil would widen the markets within its reach. Whereas petroleum is—as I have shown in a previous chapter—not price-elastic for limited fluctuations, it is definitely elastic when it comes to a very large price increase or decrease, i.e. the position is identical with that on the supply side. It has been said that

> "the demand for oil is practically unlimited and, no matter how much is produced, it will always be used for some purpose. If oil producers were able to guarantee a twenty-five year supply of fuel oil at 50 cents a barrel, or even more, a billion (thousand million) barrels per year would be demanded as soon as fuel-burning apparatus could be changed to handle the new fuel. One billion barrels would not be enough. Many billions of barrels would be used annually, if oil were cheap enough. It is the vast potential demand for oil and its products that has made possible the meteoric rise of the oil industry during the past fifteen or twenty years; and this demand will always absorb any possible amount of production. This is not saying that there has not been over-production, or that there will not be over-production in the future; but the demand always increases very rapidly, and unlimited amounts of oil could always be used for some purpose."[24]

This sort of reasoning, however, does not take into account that such increases in the use of products, made from crude oil,

would encroach upon territory traditionally covered by solid fuels like coal and would, according to current thought, mean squandering a material which is in potential short supply and leave us with coal reserves which, for the time being, appear to be quite sufficient. If this conception is acceptable—and I for one have always believed that it is—it follows that policies for the oil industry will to a certain extent have to be judged by the success they achieve in striking a balance between "reasonable" demand and "potential" supply.

The Major Groups had thus managed to establish a world order for oil that worked. Although they were in no small degree inspired by their governments—sometimes, perhaps, prompted, sometimes restrained—they had retained their formal independence, and exceedingly difficult and intricate negotiations had been left to them, each group fending for itself as best it could.

This solution, makeshift though it was, may have been the best that was possible in an era of unrepentant power politics when no truly international organization was allowed to take root. Another considerable factor was undoubtedly the withdrawal of the Russians from the scene of international oil affairs, which left the field entirely open to the Anglo-American concerns. How many of these conditions will still apply when the war in Europe is over?

It is idle to speculate now as to the chances for a super-national organization whose terms of reference would include overall control of essential raw materials. At the time of writing it seems that the "access on equal terms to the raw materials of the world," which could be achieved only if there were to be a certain degree of joint management, has become an empty phrase. But even if there is to be no omnilateral economic agreement, which would provide for a flow-plan of petroleum as a matter of course, even if exploration, exploitation, refining, and marketing are to be carried on in about the same way as hitherto, there is every likelihood that there will be a strong tendency towards bilateral and multilateral agreements on oil problems.

OIL WARS OFF

The Americans and the British, for instance, remember only too well that misunderstandings on oil matters after the last war did so much to undermine peaceful co-operation between the two English-speaking democracies. The powers-that-be are well aware that there exist at this moment many points of friction, but from

the developments of 1944 one might infer that *the two Governments have agreed not to disagree on petroleum*, come what may.

Whereas in the preceding period they tended to use the oil groups as tools for their offensive or defensive policies, and on the other hand sanctioned implicitly "peace" agreements made by the oil interests, they now appear to have declared as the firm basis of their policy that every possibility of conflict in long-term and day-to-day developments alike shall be eradicated. Perhaps this will result in a twofold change in the status of the oil groups: they may no longer be required as the shock troops for swift blows,[25] nor will their capacity of negotiating and agreeing upon the framework of a world oil peace, like the one I have portrayed, be much longer of vital importance. I had said that after 1914 the oil people became glorified agents[26] of the world Powers. Now we have moved on one stage further—the principals themselves have got together and the agents are functioning "in an advisory capacity".

WASHINGTON 1944

Although the Anglo-American "Agreement on Petroleum" signed in Washington on August 8th, 1944, was never ratified, certain of its principles which have for the first time been embodied in a State Paper cannot fail to make history.

The operative clause is, perhaps, paragraph 3 of the Introductory Article, which runs as follows:—

> "The Government of the U.S.A. and the U.K. recognise that supplies of petroleum should be derived from the various producing areas of the world with due consideration of such factors as available reserves, sound engineering practices, relevant economic factors, and the interests of producing and consuming countries, and with a view to the full satisfaction of expanding demand."[27]

These are the very doctrines of the Majors at times when they are not fighting each other. At first sight the statements appear to be purely formal, everything depending on what the parties to the Agreement understand by "available", "sound", and "relevant". Such a view, however, does less than justice to the Agreement. Once it has been decided on the highest level that the long-term interests of the signatories will be served better by co-operation than by competition, there should be no reason to expect the interference of altogether unmanageable difficulties. There might be occasional tussles and even skirmishes, but either partner will call his scouts back double quick if he has reason to

fear that their escapades may threaten essential parts of the understanding.

Some points of procedure covered by the Agreement are important—e.g. that existing rights should not be attacked: that both in the field of supply and of production no discriminatory practices should be sanctioned—but what really matters is the decision to get together and to "suggest the manner in which, over the long term, estimated demand may best be satisfied by production equitably distributed among the various producing countries. . . ."[28]

AMERICAN CRITICISM

Surely Mr. Pew, Sun Oil's president, was right when he made a statement before the Petroleum Industry War Council on October 24th, 1944:—

> "The oil agreement," he said, "sets forth objectives which can be achieved only through production control, or control of marketing, or control of prices, or all of these, and I challenge anyone to dispute this assertion. What is that but a cartel?"[29]

Cartel, indeed, but what then was the "understanding" to maintain the world price structure at the level of American stripper well cost? Mr. Pew's chagrin is not really caused by *what* was done in Washington, one cannot remember hearing such vocal protest when Teagle came to terms with Deterding, but he does mind *who* did it. What frightens him is not the prospect of an international agreement, it is the spectre of Federal control.

Does Mr. Pew really expect to have his cake and eat it? No oil agreement that did not bear the signature of a government, affixed after thorough preparation and testing of public opinion, would be worth the paper it was written on. The days when an oil peace could be arranged in the rarefied atmosphere of some castle in Scotland are past, not to return in our lifetime.

It looks, however, as if those taking part in these discussions are sometimes talking at cross purposes. Some of the major companies, usually champions of the idea of "healthy," i.e. limited, competition become restive when they see the Administration adopt their own tenets and President Roosevelt, whose stalwart lieutenant, Mr. Ickes, was never known to let pass an opportunity for propagating the gospel of over-all organization for the industry, anathematized international cartels.

CONFOUND CARTELS!

A few weeks after the stillborn Anglo-American Oil Pact of 1944 was signed, President Roosevelt wrote to Mr. Hull:—

> "During the past half century the United States has developed a tradition in opposition to private monopolies. The Sherman and Clayton Acts have become as much a part of the American way of life as the due clause of the Constitution. By protecting the consumer against monopoly these statutes guarantee him the benefits of competition."

And he went on to say:—

> "Unfortunately, a number of foreign countries, particularly in Continental Europe, do not possess such a tradition against cartels. On the contrary, cartels have received encouragement from some of these governments. Especially is this true with respect to Germany. Moreover cartels were utilized by the Nazis as governmental instrumentalities to achieve political ends. The history of the use of the I.G. Farben trust by the Nazis reads like a detective story. The defeat of the Nazi armies will have to be followed by the eradication of these weapons of economic warfare. But more than the elimination of the political activities of German cartels will be required. Cartel practices which restrict the free flow of goods in foreign commerce will have to be curbed."[30]

The reply to such a statement can perhaps best be given in the words of an American correspondent of the London weekly, *The Economist*, who wrote at about the same time:—

> "Exchange controls, import quotas, bulk purchases by government, bilateral agreements and cartels (but not commodity agreements) are pretty generally discussed as though they were invented by Hitler. It follows that all nations are expected, upon the defeat of Hitler, to remove these controls with the same enthusiasm which the French Forces of the Interior demonstrated in rising against the German forces occupying Paris. Little consideration is given to the argument that these national controls of foreign trade originated, in part, because of fundamental difficulties in the maintenance of equilibrium in the international balance of payments."[31]

The plain truth is that policies cannot be condemned simply on the grounds that they have been used to attain sinister objectives. Whatever organizations intend to plan for production or trading on a national or international scale will have to make use of a technique similar to that evolved by cartels.

Once again the most lucid interpretation of the problem is to be found in the columns of *The Economist:*—

> "It is no more possible in the international sphere than in the domestic to argue in terms of black and white. To condemn cartels is one thing, but to condemn all forms of economic organization that include the exercise of purposive direction over production is an entirely different thing. In the international sphere, as in the domestic, it is necessary to distinguish and to define."[32]

This statement is followed by an exposition which fits the oil industry like a glove:—

> "The first set of circumstances is to prevent excessive fluctuations of the prices of primary materials. It is hardly necessary to argue either the social damage done by these fluctuations in the producing countries, or the economic damage they do in stimulating over-investment at some times and under-maintenance at others. Real world income, not to mention world social welfare, would unquestionably be enhanced if raw material prices, without being higher on the average, could be stabilized.
>
> "The second leading case is at the other end of the economic scale, in industries which require a very heavy investment of fixed capital. In these industries, since the prime cost of production is so far below the total cost (including overheads), there is always the possibility of 'weak selling' and the consequent consumption of capital. The community loses in the end, when it finds itself with a derelict industry on its hands and faced with the necessity of very heavy expenditure for rehabilitation. Without some assurance of stability, investment will not be undertaken, and since a steady flow of investment is the chief prescription for a rising world income, as for a rising national income, anything that will insure stability is in the common interest."[32]

I refer to American criticism only because I am afraid that our American friends and colleagues are making things a bit too easy for themselves by using the cartel bogey whenever they see something which does not appear to suit their book. One is reminded of the American definition coined at the expense of that outstanding man, the one-time Assistant Attorney General: "A cartel," it runs, "is what Mr. Thurman Arnold dislikes".

Whatever the immediate future may have in store for us, the fact that in 1944 two Governments, whose spheres of interest contain practically all oil reserves outside the U.S.S.R., have concerned themselves explicitly with "supplies of petroleum available in international trade" and with "estimates of world demand for petroleum," will be recalled as one of the outstanding events in the history of oil. Furthermore, it is obvious that, should the U.S.S.R. take her place once more among the international oil powers, the tendency of handling petroleum affairs as an immediate concern of the State will be still more pronounced.

Despite appearances to the contrary, the Russian Nafta Syndicate has not always been really hostile towards the Majors. It was rather the other way round: Sojusneft frequently showed a realization of the solidarity which is characteristic of the relations between very big units once they have recognized that neither of them can eliminate the other. There is thus no *prima facie* reason why the Russians should not come to terms with the Majors, but the very fact that in the U.S.S.R. political and

business spheres are identical will leave other countries no alternative but to provide for a similar unity, if they wish to maintain an equal status.[33]

LONDON, 1945

The trend of events during the year that passed between the signature of the 1944 Oil Agreement in Washington and that of its watered-down second edition in London does not really cut across what I have just said. The objections to the original text were directed against its ambiguity which disturbed those who believed, rightly or wrongly, that it was but the façade of a far-reaching division of supplies and markets. Those, however, who would have accepted more concrete commitments, had they only been properly set out, had the ground cut from under their feet by the protests voiced in the United States by those who refused to enter into *any* working agreement likely to prejudice their freedom of action.

Thus the agreement signed on September 24th, 1945, differs from the one of August 8th, 1944, in that it has apparently no teeth left. So as to make it acceptable to Congress and to dispel the misgivings of American producers, all clauses which could be construed as affecting domestic economic factors in the States have been removed and what remains looks in the first instance as if it were nothing but a string of pious platitudes; indeed, a wit has described the Agreement as "a Japanese kimono which covers everything and touches nothing".

Nevertheless, the very fact that the International Petroleum Commission is to be set up after all "to report as to means by which . . . demands and supplies may be correlated so as to further the efficient and orderly conduct of the international petroleum trade", shows that the original motives for an agreement not to disagree have remained as potent as ever. True, lip-service is paid to the desirability of "petroleum being accessible in international trade on a competitive . . . basis," but elsewhere there is another reference to the need for "efficient and orderly development of the international petroleum trade." "Orderly" is the operative word: no sooner was the Agreement signed than Mr. Shinwell, the British Minister responsible for petroleum, pointed out that it "will introduce some measure of order into the industry throughout the world, which will be to the advantage of all of us." That being so, the Agreement may prove to be more than the "gesture" as which it was described by Mr. Shinwell. There is an inescapable

logic of events which can be camouflaged for the sake of pacifying certain powerful interests, but which will prevail none the less.

Only by contracting out of international petroleum trade can the United States oil companies avoid recognizing the need for some effective machinery of international co-operation. In the next few years there might be a certain amount of stress and strain in the oil world, but none of the participants in the game is likely to forget the lesson of the all-round benefits they, and not they alone, had derived during the period of "orderly" development in the 'thirties. The International Petroleum Commission has been launched, the sails are set, and those in charge will soon see which way the wind blows.

REPERCUSSIONS ON MARKETING

The advent of government agencies taking direct interest in petroleum affairs will affect the Major Companies not only in respect of production and refining, but also on the distribution side.

In most countries outside the U.S.A. 50 to 80 per cent. of petroleum products are marketed by companies associated with Standard Oil,[34] Shell and Anglo-Iranian, commonly called "The Group." The reason for this is that only concerns with very great, and preferably widely dispersed, sources of supply can guarantee a steady flow of products, independent of fluctuations of output in any particular area and unaffected by ups and downs in prices and freight rates. Only the Majors could afford to invest the large amounts required for a network of storage and distribution facilities because only they were assured of a continuous "load" and, being big producers, they simply *had* to make sure of safe outlets for their oil. The interplay of supply and of demand factors is most interesting: it is a fallacy that moves in the oil game are always promoted by the desire to *secure* oil. The urge to control sources of supply is the basic motive, but it is in peace-time of a potential rather than of an immediate nature. Its counterpart, the need for *markets*, is from time to time of much greater urgency, and the sagacity of the men who attended the preliminary Washington conference of oil experts in the spring of 1944 is proved by their envisaging a post-war age of oil plenty rather than of scarcity. The tendency, however, to acquire oil fields even when oil is almost unsaleable shows the prevalence of long-term considerations.

Should some sort of "access on equal terms" to the sources of

oil supplies be established in earnest, i.e. should the security of supply no longer depend on a deal with a private concern, would importing countries still be justified in allowing foreign corporations to occupy key positions in the distribution of a vital material? And would there still be the same incentive for the Majors to establish themselves in the distribution trade of scores of countries, if they could be sure of a market for their products on the basis of an overall agreement as to the direction in which oil will be allowed, or encouraged, to flow? Such an agreement would, incidentally, make domestic markets less competitive and with pressure of overseas supply or demand no longer bearing directly upon markets, they would not be nearly so fretful. With the main decisions on how to bring supply and demand together taken on a different level, the oil industry proper would, in a way, lose its international character. It would become what it never was yet—parochial.

These are very grave problems indeed, and their solution will certainly tax the imagination of both producers and consumers. I want only at this stage to draw your attention to the dilemma which will confront the powers-that-be and to show how widespread will be the repercussions of the change in the Majors' status. The impending loss of their once exalted position conforms perhaps with similar developments in the industrial sphere at large.

WEIGHT OR SPEED?

A short while ago I referred in an article, published in a British journal, to some aspects of industrial concentration and, dealing with the comparative standing of big and medium-sized undertakings, I said:—

> "The relation of huge groups to smaller units, which is of such moment in all these discussions, is now being scrutinized in the States from the point of view of their respective roles in the war effort. The big oil companies and those of the chemical and steel industry have tremendous achievements to their credit, but many of the tasks have proved too big even for them. These have had to be planned and financed by the Administration for whose account the operation has been carried out by the Industrialists. This has reduced the gap between the colossi and the smaller fry, and has thrown into relief certain advantages of more streamlined organizations who are not hampered by their own weight and who can run faster than millipedes."[35]

It will be realized that once even the very big corporations have to fall back upon national or international authorities their spell is broken; never again will they be treated as if they were in a class of their own and powers in their own right.

Chapter 2

COMPETITION AND CONTROL

SOONER or later the student must come up against this crucial problem: which form of organization will be the most beneficial to the oil industry from the long- and short-term point of view? Here this general question can be particularized in two fundamental questions:—

(1) Is it more likely that supply and demand can best be brought in line by free competition or by its restraint?
(2) If some "planning" is deemed necessary, should it be left to the industry itself to devise ways and means, or is it definitely a public concern?

The answer to the first question will mainly depend on what we mean by free competition. There is the Continental—originally German—conception which includes the right of the individual *entrepreneur* under a system of free enterprise to combine with a view to restricting competition, and the American which excludes this right of combination. It is not for me to pass judgment upon the comparative merits of these theories, but what I am concerned with at this stage is to show what happens in the oil industry under these alternative conditions.

WAS COMPETITION EVER "FREE"?

Unless my reading of the oil industry's structure and history is altogether wrong, there is no question that there has been, always and everywhere, an overwhelming tendency towards concentration, integration, and cartelization in the petroleum industry. This goes far deeper than Adam Smith's taunt that

> "people in the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public or in some contrivance to raise prices."

It is, as I hope I have proved, due to the very fact that all-out competition, where it is allowed to prevail in the oil industry, leads either straight to general bankruptcy or to the monopoly of a survivor.[36]

In countries where horizontal combinations are not deemed illegal the industry has been found to be controlled by an inner

ring of first-rank firms, surrounded by a middle-class of hangers-on, with an outer corona of antagonists. In the United States a unique structure has emerged which serves the same purpose of stabilizing the markets by an intricate, if informal, system of "leadership," buttressed by extensive control of the transport system and virtual control of refining and of large-scale marketing.

There can thus be little doubt that competition—spontaneous or even "enforced"—results in the formation of a "hard core" whose monopolistic tendencies are more or less tempered by actual competition from outsiders and by potential competition among the leading members themselves.

I should like to refer those who are not prepared to accept historical evidence as sufficient proof for the validity of an economic doctrine to the current beliefs on the most adequate method of exploiting exhaustible or semi-exhaustible raw materials—what has for a long time been the basis of enlightened forestry has now become the recognized practice in working other natural resources. In one of the monographs, commissioned by the Temporary National Economic Committee (T.N.E.C.), dealing with various aspects of "Concentration of Economic Power" in the U.S.A., one can find the following passage:—

> "Competition contributes to efficiency in manufacturing and in distribution; it causes inefficiency in the utilization of natural resources. Competition in the production of timber, bituminous coal, and petroleum hinders the application of improved technology and encourages the employment of wasteful methods of exploitation. It may provide the consumer with a large supply at a low price for the time being, but it does so at the expense of future generations. Competition is not conducive to conservation. Where competition does contribute to efficiency, the gain is offset, in part, by the wastes which it entails."(37)

A still more unequivocal statement is to be found in *The Oil Industry and the Competitive System*, where G. W. Stocking says in so many words that

> "the scientific and economic development of oil production is opposed rather than promoted by the competitive system."(38)

NATURAL MONOPOLY

For once Pogue and Ise are of the same mind, the former speaks about the petroleum industry as an

> "activity that would be expected, from a purely physical standpoint, to function with maximum efficiency as a natural monopoly."(39)

The latter goes a step further, stating that

> "the oil industry is in many respects a natural monopoly."(40)

Should we be prepared to accept, if only for argument's sake, the statement that integration, concentration, and co-operation are endemic features of the oil industry, we may perhaps also agree on the conception that *the organizing forces within the industry are not "restraining" competition which would otherwise be "free," but rather developing a peculiar blend of monopolistic and competitive tendencies* whose interplay have shaped the industry from its beginnings to this very day.

This still leaves the second question: who should do the planning? Here again there is no patent solution, no panacea for the "sea of troubles" besetting the oil industry.

The answer to the question whether or not the oil industry in a given country is satisfactorily organized depends entirely on the principles guiding the policies of that country. There the behaviour of oilmen, as in the international field, cannot be judged without taking into account the state of affairs prevailing generally at the time. If the very principles of communal life are under review, any change on that level may outlaw practices which were formerly quite acceptable, and any change of premises, as it were, may provide opportunities for action which hitherto did not exist.

THE CASE OF THE U.S.S.R.

That the oil industry can function successfully under a regime of complete state monopoly has been proved conclusively by the record of the U.S.S.R. Informative material available to the foreign observer dealing with the actual structure of the industry in the Soviet orbit is of the scantiest,[41] but the performance of the Russian war machine since 1941 is ample proof that her engines are generously provided with fuel and her wheels well oiled. I do not share the view of some enthusiasts that the fight the Red Army has put up is, by itself, an acid test of the whole Soviet system—to make this contention would lead to our admiring the Nazi regime on account of feats performed by the Wehrmacht—but there can be no doubt that state management of petroleum has delivered the goods. The oil industry of the U.S.S.R., starting in 1921 almost from scratch with a crude production that had dropped to three million tons, appears to have achieved in 1939 an output of 30 million tons, if not more. Deterding, whose perspicacity was severely impaired when he happened to be in a mood of frustration, was certainly wrong when he predicted that the Bolshevist regime might be able to exploit existing fields, living on accumulated fat, as it were, but

that it would never be equal to the task of exploring new fields and finding new oil. The "second Baku" in the Ural region, and several other fields of the first magnitude, testify that prospecting for crude *is* possible, even in the absence of traditional stimuli. The patent fact that a system, not based on the profit motive in the orthodox sense of the word,[42] which can be as efficient as the Soviet oil industry has proved to be, must be taken into account when judgment is passed upon the various possible systems.

NOT SAUCE FOR THE GANDER

Such success within the framework of state-run economic life will hardly come as a surprise to those who recognize the advantages of centralized management in the oil industry, but it does not follow that state monopoly would always score on its merits. It is, on the contrary, rather likely that a government monopoly of oil production or refining might turn out to be a doubtful venture in a country where the *general* constitution of trade and industry conforms to the pattern of competitive activities. To single out petroleum as a "key" industry for special treatment, to sever its connection with the bloodstream of "capitalist" business, is asking for trouble. This would, in a way, mean making the worst of both worlds. Such an oil monopoly would enjoy neither the advantages of fully-fledged planning, nor the impetus provided by the rivalry of competing units.

It is beyond doubt that the oil industry owes much to private enterprise, to the pioneering spirit of those in search of fresh fields and markets new. For a long time the Majors in the States have been wont to emphasize how indispensable was the enterprise of the small producer. Although current progress in geophysical methods has made exploration more scientific—it is not so much an art as it was, say, twenty years ago—Farish went as far as to say that

> "the credit for the discovery of America's oil fields goes to the small exploratory enterprise rather than the large organization. It is the individual, the small company, the so-called independent, the itinerant wildcatter, who found America's oil".[43]

Although this enthusiasm for the "little feller" may owe a lot to the perfect alibi he provides for those who are sometimes charged with having established monopolistic control, there is a solid core of truth in such eulogies of individual oil enterprise.

Its merits are not altogether confined to the producing side.

The pieces which the oil industry has to render in countries without total planning are rather too intricate to be played by a brass band. The world would be poorer and a duller place if the keen fire of rivalry was to be smothered by government autocracy, however enlightened.

LIMITATIONS OF THE INDEPENDENTS

On the other hand, if what I have said about the structure and the history of the oil industry shows anything, it is that competition has in every respect and all along been subject to a high degree of voluntary or compulsory control. Those who have, sometimes with every justification, preached the intrinsic virtues of a firm leadership for the industry, will find it difficult to deny that petroleum lends itself to organization round a few focal points. They are not in the happy position of the out-and-out antagonists of concentration and integration, of the trust busters whose attitude is quite consistent, since they believe that the dissolution of pre-1911 Standard Oil was a step in the right direction, and that, to break the control of the Majors, pipe-lines should be divorced from the oil industry. The case of this school of thought has been lucidly presented in many statements of the Federal Anti-Trust Division, and within the petroleum industry the most complete rendering is to be found in W. J. Kemnitzer's *Rebirth of Monopoly*. His book contains a great number of excellent points, but it suffers, as do similar pleas for the cause of Independents, from the determination not to be amused by anything the Majors do. There is a tendency among the spokesmen of "independent" interests to shut their eyes to the almost overwhelming tendency of the industry towards concentration. Whilst they are eager to give a vivid account of the shortcomings of the present set-up, they are never equally articulate when it comes to saying how the Independents could possibly run the industry without themselves becoming "Majors."[44] Nevertheless, their argument is in keeping with their basic principle that the "unit" of the industry must be kept comparatively small. The spokesmen of the Majors are up against a far more formidable difficulty. Their stock-in-trade is the need for big units, for integration, for large-scale operations, and long-term policies. From such a platform the fight against planning by other agencies—national or international—is a much harder one.

DUAL ROLE OF THE MAJORS

The justification for the existence of the Majors is that they play an indispensable role. It does not consist in their being just one of the competitors, but in their being so big that at times they cannot help thinking and acting as leaders in the true sense of the word. In the preceding chapter I have told the story of the host of associations of oilmen, operating on an equal level, who could not find a form of organization that would outlast the first storm, because the interests of each one of them were identical to such an extent as to be, in the end, incompatible. The very big man, however, can contrive to live side by side with smaller units. He can keep them in line up to a point, and can afford to make valuable concessions designed to secure their agreement (see above, p. 86). By thus forming the nucleus of an organic structure the Majors are, in a way, acting as authorities who, however much they may be pursuing their own ends, function as trustees of the public. Much as the Majors' performance of these duties is appreciated, it remains true that they could, given certain circumstances, be performed as well, or better, or at least more equitably, by agencies responsible, not to their shareholders, but to the public itself. If in an industry there is a need for a certain degree of regimentation, for what the Americans call a "Code", it will be more readily accepted if it is devised and enforced by an authority with no axe to grind. Faced with the choice between two evils, one would probably have to agree with Kemnitzer when he says that

> "bureaucracy in government is bad enough *per se* but when it is dominated by private monopoly, the situation is intolerable".[45]

Incidentally, Kemnitzer's *leitmotif*, the evil aspect of proration, set against the Majors' homilies on its importance for the common good, shows the disposition of the opposing forces. The Majors have fully realized that a certain regulation or stabilization—if that term should be more acceptable—of crude supply could not be achieved without governmental influence. The contention that proration was nothing more than a scheme of the big groups to re-establish monopoly is certainly an over-simplification. Does not the opposite view, that the role of "evener" had to be taken over by some authority other than the Majors, offer much more interesting possibilities?

ECONOMICS OF PRORATION

Proration, as it has developed in the United States, is the foremost example of what can be achieved. Agreements between producers have always been thought to be necessary in some form or other because of the poor price-elasticity of crude (see above, p. 17 and p. 57). The record of these understandings, the participants themselves seeing to it that they are not in the long run viable, proves them to be, in Hobbes' words, "nasty, brutish and short where there is no power to overawe them all".[46] As early as 1924, when President Coolidge took the first timid steps towards conservation by constituting the Federal Oil Conservation Board, he thought it necessary to refer to the peculiar relationship of industry and government. He first paid lip-service to freedom of enterprise by saying that

> "the oil industry itself might be permitted to determine its own future";

but then he went on:—

> "The future might be left to the simple working of the law of supply and demand, but for the patent fact that the oil industry's welfare is so intimately linked with the industrial prosperity and safety of the whole people, that Government and business men can well join forces to work out this problem of practical conservation."

Public interest, however, was not strong enough to force even a limited measure of control down the throat of a suspicious industry, and it was only the repeated and unmanageable glut of the late 'twenties and the early 'thirties which left it with no alternative other than the calling in of the administrative powers of State Governors.[47]

Proration, as we have come to understand it, is a first-rate example of the marrying of communal and private interest. The general outline is worked out by an authority, but within this framework the actual job is done by private enterprise, and the efforts, the skill, the resourcefulness—and the resources—of the competitors still determine their respective standing.

> "This . . . has revolutionized the way of doing business all over the world. The time was ripe for it. It had to come, though all we saw at the moment was the need to save ourselves from wasteful conditions. . . ."

Is that the voice of an advocate of governmental influence, of conservation by statutory law? Not quite. It is, in fact, what old John D. had to say about the Standard Oil Trust, and it was also he who concluded triumphantly:

> "The day of combination is here to stay. Individualism has gone, never to return."[48]

THE CHANGING OF THE GUARD

The difference is that since then the meaning of the word "combination" has changed. In the United States of the 'seventies only a super-firm could act as "stabilizer"—in different circumstances a combine of several groups was the adequate answer—to-day we have a series of techniques by whose application we can achieve the legitimate objects of Rockefeller's great plan without incurring all its iniquities and dangers to the public interest. And if there is, as there may well be, some hardship and hindrance to be undergone,[49] we shall just have to recall the famous dictum of John D. Rockefeller, Jr.:—

> "The American beauty rose can be produced in all its splendour only by sacrificing the early buds that grow up around it."[50]

It does not make sense to object to "state interference" or to regulations, imposed by agencies outside the oil industry, in the name of "orthodox" free competition. My narrative and description of the structure of the petroleum industry shows that there has prevailed, always and everywhere, *a state of monopoly, qualified by competition*, or, if you prefer it the other way round, *a state of competition, qualified by monopolistic control.*

IMPERFECT COMPETITION

Although the oil industry may be one of the foremost examples of such "imperfect competition",[51] its problems are, in general, those of contemporary industry. Some features, familiar to the reader of this book, were brought into sharp relief by an English economist writing in *The Times* about the Bretton Woods conference on international monetary policy. He referred to the necessity for

> "the application of quantitative controls, especially for staple foodstuffs and raw materials, where the price mechanism fails even more conspicuously than elsewhere."[52]

If this is a particularly appropriate description of what happens in the realm of crude production, a further statement of the same contributor appears to cover the refining stage:—

> "The 'rigidity' of modern industry", he said, "cannot be spirited away, and the methods of trade must provide such stability as highly capitalized industry requires in order to be efficient. Unbridled competition, creating uncertainty everywhere, is inimical to large-scale investment and long-range development."[52]

Oil may, however, differ from some other industries in so far as it nearly always *was* organized in such a way as to have some sort of "quantitative control" applied and allowance for the "rigidity" factor was made by market leaders, big enough to be "rigid" without disintegrating under a sudden or unexpected impact. *The problem is therefore not for the authorities to enforce a new system but, if and when necessary, to take over some of the functions so far fulfilled, more or less successfully, by the major companies. Whoever is going to exercise control over the petroleum industry will be in the happy position of carrying on a great and deep-rooted tradition.*

It may be asked, not without justification, Why change? Has not the traditional system stood the test of two generations? Has not even P. L. Yates, an English Fabian socialist, writing on "Commodity Control,"[53] admitted that of all the raw materials whose economic structure he investigated, mineral oils were perhaps the most efficiently managed?

The answer will be that, though in a *laissez faire* world the particular brand of competition-cum-control developed by the petroleum industry would appear to be entirely adequate, it is an altogether different proposition to fit it into the current trend of economic life. The scene was set for such a change some time ago: the rising influence of governments in international oil deals, export and import tariffs and regulations for the location of industry, and, finally, the fact that the state authorities had to be called in to enforce proration—there has been little doubt as to which way the wind was blowing.

Full realization of the new relationship of government and industry in general is bound to lead to further progress in the same direction. It is hardly possible to appreciate conditions in any one industry without taking into account the prevailing state of affairs in the others. The salient fact is that governments have no alternative to concerning themselves directly with industrial developments, once they have made themselves immediately responsible for their peoples' "pursuit of happiness", i.e. as things are to-day, for full employment.

FULL EMPLOYMENT AND *LAISSER FAIRE*

I have never had the slightest doubt that the thesis that a maximum of goods would be made available with the least cost if economic factors were left to find their own level without any interference from other agencies, was irrefutable[54] as far as it

went. The problem, however, is, just how far it goes, or perhaps how far we can afford to let it go. Such conception presupposes a complete interchangeability of materials and men—no *laissez faire* without *laisser aller*—and it cannot function without a continuous and sometimes ruthless elimination of certain means of production in favour of more efficient or effective competitors.

None of these conditions ever obtained completely, but fifty or eighty years ago people, and capital for that matter, could migrate comparatively easily to lands where work or investment yielded greater benefit, whereas in our century both have become immobilized by the rising tide of nationalism. Another point is more momentous still: the system of "free" economy works only, if all elements of production can be treated alike—if I find that a piece of plant does not longer fulfil its purpose, I scrap it; and if the workmen are no longer worth their pay, I sack them. Within the framework of an expanding economy this may be of no great moment, involving nothing but a swift change-over from one job to another; in different circumstances, however, and as a mass occurrence, the problem becomes insoluble, as far as the individual wage-earner is concerned. His plight makes us realize that the worker is not just an "expendable" tool, and that his welfare cannot ultimately be subordinated to what used to be called "purely economic considerations".

Once it has thus been found impossible to apply such considerations to the human element in industry, selective elimination which entails the survival of the fittest ceases to operate. Once we elect to consider *one* element in the process of production as taboo and decide to "fix" it, we shall in due course have to fix or, at least, control *all* the other elements as well. This is no criticism of the "full employment" idea, but it is imperative that any investigation of current and future industrial trends should start off with a review of its repercussions. There is no full employment without tears. My terms of reference do not include discussion of this problem of our social organization, nor will I take sides in the controversy between, say, Professor Hayek, who foresees that planned economy will lead to universal tyranny, and Sir William Beveridge, who maintains that not all "freedoms" are of the same order, and that we have to sacrifice some of them so as to enjoy those which are, as he puts it, "essential". My reference to some of the concomitants of a Full Employment Policy is intended simply and solely as a starting point for an outline of the position which the oil industry would fill within the framework of such a system.

NO FEUDALISM

If any control exercised in oil affairs, undertaken in the process of over-all planning of investment and production, is to embody the cardinal advantages of the traditional set-up it will have to be restricted to the minimum and so give individual enterprise as much leeway as possible. I make no excuse for citing once again the case of proration, for there is hardly a better example of the application of such methods as I have in mind.

By stating the "allowables" for certain areas the authorities do not directly infringe upon the right of the individual holder of a lease to exploit it, they only make sure that the rate of its exploitation will be in line with that of all other interested parties. This principle admits of considerable refinement and the original somewhat awkward system of limiting the output of the wells only, thus putting a premium upon excessive drilling, has been much improved.[55]

The acid test of any arrangement of this kind will always be its success in maintaining the incentive for efficiency and progressive thinking despite the unavoidable integration into a general plan. A modern feudalism with bounties bestowed upon pressure groups and patronage meted out to gangs of political camp-followers has no chance of survival, but it should not be beyond our capacity to devise a system which ensures the necessary minimum of conformity with a maximum of liberty. In other words, it is neither the state-run monopoly nor state-controlled public corporation which is likely to give the best results in our highly diversified industry, but rather a system which creates certain conditions under which the men on the job can compete by making use of their wits no less than their skill.

A CLEVER DEVICE

What happened some ten years ago in one of the countries on the Continent of Europe should serve as a good example for the potentialities of such a system. The paramount problem of the Polish oil industry in the period between the wars was to encourage exploration and drilling in the face of the unalterable fact that the cost of production greatly exceeded the world market price for crude. The familiar method of protecting indigenous crude by imposing import tariffs did not meet the case completely, for the reason that domestic consumption, though rapidly expanding, still failed to absorb the total production. Every time one of the

cartels broke down each refiner endeavoured to sell as much as possible in the more lucrative home market, leaving it to the competitor to dump his products abroad. This inevitably led to domestic prices being forced down to export levels—in spite of the tariff protection—and to crude prices falling below production cost. Because of its desire to maintain and increase crude production this state of affairs did not please the Polish Government, not only for military and political reasons, but also in view of the impending rise in home consumption which was in due course to obviate altogether the necessity of petroleum exports.

After the failure of several attempts at voluntary co-operation the government devised a remarkable scheme. Although the maintenance of prices in the domestic market for finished products was the immediate object, since without it prices would have dropped below subsistence level, they refrained from any interference in that field. They were content to earmark a certain part of each refiner's output for export, the balance being available for sale within the country. "Allowables" for domestic sales were fixed monthly on the basis of statistical evidence, and as no one could increase his share in the remunerative market by underselling his competitor, prices were kept at a level which made it possible to pay a crude price to the producer sufficient to encourage exploration and drilling.

The interesting feature of the scheme was that it involved no interference beyond the fixing of a compulsory export quota and some safeguards against extortionate prices for domestic sales of finished products. Since quotas were assessed as a percentage of refinery throughput, refiners were encouraged to operate on the highest possible level so as to maximize their share in the domestic market; whereas they did not actually compete as far as their sales were concerned, they were active competitors as producers or buyers of crude, and this was exactly what the government wanted to achieve. True enough, the whole scheme amounted to nothing but a subsidy for indigenous crude, which might or might not have been justifiable, but the interesting point is that the object was achieved without setting up a big bureaucratic machinery and without interference except in a remote corner of the industry. It left the profit incentive of all concerned unimpaired, but, at the same time, ensured that the ultimate benefit would be derived by the producers, i.e. by those whose protection was intended.[56]

It will be seen that such a system is akin to that which underlies

proration in the United States, notwithstanding the fact that it was proration in reverse, that it aimed at increasing not at limiting crude output. Its possible applications in different circumstances deserve careful and objective study.

It remains only to investigate a few actual problems whose solution, in the circumstances, cannot be found in any other way than by the co-operation of authorities and industry.

WHERE TO BUILD REFINERIES

It is generally accepted that one of the main points on which agencies responsible for the maintenance of full employment will focus their attention is the location of industry.[57] This, as far as petroleum is concerned, is in the first instance an international problem, the main question being where oil should be refined, in the country of origin where there is often no appreciable domestic demand, or in consumer countries where—as, for instance, in the United Kingdom, France, or Germany—there is no sizeable indigenous production.

Until the reorientation of the French petroleum policy in the 'thirties the practice was to leave the decision as to where refining was to be carried out to the oil interests, whose views on the matter were determined partly by technical consideration (see above, p. 48, for the transport factors involved), partly by the desire to concentrate refining activities in areas where independents could not easily set themselves up and where, as it so happened, the incidence of taxation was comparatively tolerable. More recently, however, this question has taken a more serious turn in so far as some of the producer countries, who hitherto concentrated on obtaining royalties for crude, are staking definite claims for oil refineries to be built on the spot—the developments in Venezuela are a case in point—and, at the other side of the picture, it looks as if more and more governments in consumer countries are at last realizing the importance of home refining. This tendency is little more than the natural reaction to the pressure which can be brought to bear by the producer countries. The policy of crude producing countries now emerging should effectively destroy the illusion that there exists a free world market for crude oil. Once crude exports are hampered by a move towards compulsory concentration of refining near the wells, consumers will have to take appropriate measures to protect their interests.[58] The main reason, however, for the much greater concern about this issue, now being shown in the camp of consumer countries,

is the enhanced importance of the existence of refineries within the borders of a country.

This concern is chiefly due to the difference in value of crude oil and finished products, which has gone on rising for a long time,[59] and as long as importers have to watch their foreign exchange position this difference will exercise their minds a great deal. The other motive for Home Refining in consumer countries is the advantage of having an oil industry on your doorstep so as to derive from it the chemical raw materials which are likely to be of more and more importance to the industrial life of any country.[60]

It is probable that decisions involving a compromise between the legitimate interests of both the producer and consumer countries cannot be taken on the level of the industry, but are essentially a matter for international negotiations between governments. Again, as to the advisability of making chemical raw materials available, it would be unfair to expect the petroleum industry to act on its own without "guidance" on national economic policy.

PUBLIC UTILITY

Control of the location of industry by way of tariffs has always been the protectionists' stock-in-trade, but more recently the idea has gained ground that such industrial advantages should be made conditional upon the observance of certain approved trade practices. Such *privilegium onerosum* has always been a feature of undertakings like railways, gas works, power stations, etc., whose status as monopolists was bound up with a certain degree of public control.[61]

The question whether or not the oil industry would lend itself to such procedure—indeed, whether it can be classified as a Public Utility—has been raised more than once. The answer will depend partly on what one understands by this term, which is more commonly used in the United States than in other English-speaking countries.[62] If we accept one of the orthodox definitions, according to which

> "Public Utilities are business, affected with a public interest",

then the status of the oil industry as a Public Utility has long ago been recognized in so far as governments consider international oil affairs as subject to their Eminent Domain.

There is, however, yet another aspect of the Public Utility status worth our serious consideration. For a long time it has been

accepted that railways, gas works, and telephone networks require a secure "living space" of their own to justify the heavy capital outlay involved; alongside went the consideration that it was a waste and a nuisance to have two or more competing gas companies tearing up the streets and laying pipes all over the place; similar, though technically different, circumstances generally prevail in the case of railways, waterworks, and power stations. Whereas several of the Public Utility features—high fixed capital and need for a certain degree of protection, statutory or otherwise—are noticeable in the petroleum industry, the most striking structural similarity is to be found at the oil transport stage.

In an earlier chapter I have referred to pipe-lines as the ideal carrier of a liquid used on a big scale.[63] But their advantages are, as I said, available only to those who control a considerable and steady flow of material. The fact that pipe-lines tend to strengthen further the position of the largest competitor has for the last forty years or so created a series of economic and legal problems in the United States essentially identical to those of Public Utilities.

The solution attempted in the States was intended to mitigate the discriminatory character of pipe-lines owned by oil interests by making them Common Carriers. As such they were under compulsion to accept and deliver oil for anybody who cared to tender it to them, and it has rightly been said that "the common carrier is the matrix of public utility classification".[64]

A SCHEME FOR OIL TRANSPORT

Conditions in Europe are, however, different from those in the States. In America pipe-lines were built by some oil companies and were afterwards—more or less successfully—neutralized by imposing the Common Carrier status upon them. In many European countries, on the other hand, the advantages of handling petroleum on the largest scale are within our reach only if the whole or at least the greater part of the industry co-operates at the transport stage.

Rational organization of transport does not only involve pooling for the sake of the constant flow on which pipe-line economics hinge, it means also reducing to a minimum cross-transport by distributors exchanging products, the whole scheme amounting to a joint planning of storage arrangements.

It is highly significant that exchange of products has for some time been practised on a large scale by the Major companies in

the U.S.A.,[65] in the international field at large, and also within some of the European countries. The intrinsic advantages of these dispositions are obvious, they were amongst the most cherished prizes of the general understanding between the Majors. However, as long as such benefit is confined to a certain charmed circle it remains discriminatory. This problem could be solved by making *storage and transport* of bulk materials, like motor spirit, diesel, and fuel oil, *a public service.*

In the United States, with its rapidly shifting centres of crude production, there might be a strong case for leaving the pipe-line programme in the hands of the interested parties. In consumer countries, however, with their comparatively stable supply conditions there is much to be said for a statutory organization linking the deep-sea port with strategically located bulk terminals from which distributing companies would draw their supplies. Such an arrangement would not necessarily affect the ownership of the oil itself, it can be envisaged as covering the transport function only, besides its role as a clearing house. Thus a distributor would have to make provision for supply of material to the pool before he could draw deliveries from the network. This system would, moreover, give the smaller competitor a chance of availing himself of the advantages of large-scale handling of a liquid, in other circumstances available only to the biggest units.[66]

Taking Great Britain as an example, let us list the problems of organization which will have to be solved after the war:—

The complete pooling of storage space and transport equipment under the Petroleum Board[67] has illustrated the degree to which such services can be streamlined, and it is unlikely that Britain will ever discard all the innovations introduced originally to meet a specific emergency.

The pipe-line system built for the British Government during the war will in one way or another form the nucleus of a transport network, of an "oil grid," as it has been called.[68] If the consumption of petroleum products goes on rising steeply, there will be a definite tendency to avoid tank wagons cluttering up congested highways. By thus "going underground" oil transport enters once and for all the sphere of public utilities. One day the pooling of oil transport functions may appear as abvious a solution as the consolidation of miscellaneous railway companies.

Control of the transport system would give the Government the opportunity of making its intentions felt if necessary, but it does not involve the authorities directly in the actual running of

the industry. The long arm of coincidence, to use a Churchillian metaphor, could be seen at work when Mr. Ickes' Petroleum Reserve Corporation, bent on controlling the output of the Saudi Arabian fields without owning them, planned for a pipe-line to the Mediterranean. Once again transport proved a "critical" phase of the industry, and we can conclude our argument with a statement by G. W. Stocking:—

> "In so far as the problem of petroleum transportation is concerned, the natural monopolistic nature of the industry should be recognized and should be made the point of departure for an intelligent policy of public control."[69]

COMBINED OPERATIONS

Having, as it were, outrun my lines of communications, I cannot now go any deeper into the problems of industry and public control, but there are many more instances of both parties reaping the benefit of genuine co-operation. Such a policy will be successful only if, instead of imposing a ready-made regime upon a trade, infinite pains are taken to adapt the measures, designed to serve the public interest, to the traditional features of the industry. In the realm of petroleum that will mean accepting the big units as working entities—*it is no good trying to grow wheat in the backyard.* The prevalence of vertical integration and of horizontal associations will also have to be recognized. This book has shown that such cartels as existed tended "to regulate, but not to abolish competition". I am not sure whether this interpretation is applicable to all the cartels Lord McGowan had in mind when he coined that phrase,[70] but it certainly fits oil cartels.

Governments, for domestic or international reasons, have to insist on certain basic regulations being enforced. There is, however, no reason why outside that sphere there should be no incentive for an enterprising producer, for a genius of organization, or even for a wizard in salesmanship. I have never heard that because the bee-keeper provides a sort of prefabricated beehive his swarm is any less efficient than it used to be when housed in an old tree.

There is one crucial test, however, for all schemes to regulate industry: that is their attitude towards the newcomer. Any order, old or new, which makes an industry a closed shop is essentially unsound. Ossification and eventual atrophy are inevitable when industrialists and traders no longer feel the wholesome sensation of newcomers treading on their toes.

The structure I have in mind—centauric if you like, combining

features of the two different systems—is sure to have its full share of difficulties and shortcomings. This is quite in line with what Sir William Beveridge expects, when he says that

> "the problem of maintaining full employment is more complicated in a free society than it would be under a totalitarian regime."[71]

There is no freedom without tears either.

CONCLUSION

To sum up my argument:—

As there is always either too much or too little oil, the industry, not being self-adjusting, has an inherent tendency to extreme crises; this fact has called forth the ingenuity of planners within the trade. As no individual unit can evolve a rational production policy on its own, some sort of communal organization is almost inevitable. Paradox though it may appear, oil, competitive *par excellence*, is usually controlled by some "leading interests". The Major companies have in the past played a vital part, with the Independents as an indispensable corrective, but now their role is being taken over step by step by other agencies.

In the international field governments are severally and jointly fulfilling the function of organizing the industry. In the domestic sphere the authorities, bent on a Full Employment policy, will be compelled to act as eveners and stabilizers, thus taking a leaf out of the great oilmen's book.

Such procedure will be a success only if control, while ensuring adherence to an overall plan, leaves intact individual enterprise of the industry's component parts. Whereas decisions of a *strategic* kind cannot be evolved but on the highest level, *tactical* decisions are best left to the industry itself.

NOTES AND REFERENCES

[1] As quoted in E. H. Davenport and Sidney Russell Cooke, *The Oil Trusts and Anglo-American Relations*, London, 1923, pp. 18 *et seq.*

[2] Winston Churchill himself stressed that

> "oil had to be bought in a monopoly-ridden market" (*World Crisis* 1911–1914, p. 170).

Describing the difficulties of getting House of Commons approval of the "Anglo-Persian" Convention, he went on:—

> "This encountered a confusing variety of oppositions—economists deprecating naval expenditure; members for mining constituencies who were specially sensible of the danger of departing from the sound basis of British coal; oil magnates who objected to a national inroad upon their monopolies; Conservatives who disapproved of State trading; partisan opponents who denounced the project as an unwarrantable gamble with public money and did not hesitate to impute actual cor-

ruption. There was always a danger of these divergent forces combining on some particular stage or point. However, we gradually threaded our way through these difficulties and by the autumn the Convention was the law of the land. We now at any rate had an oil supply of our own." (p. 172).

(3) Ludwell Denny, *We Fight for Oil*, New York and London, 1928, p. 47.

(4) It can hardly be a coincidence that the attitude of public opinion towards Standard Oil underwent a change for the better at the very time when the latter began to become a holder of foreign oil (see above, p. 92, on the attitude of oil-starved countries to their petroleum kings).

(5) One example is provided by *A Foreign Oil Policy for the United States*, submitted in November, 1943, by the Foreign Operations Committee. It contains on p. 11, amongst other "bare essentials of an immediate foreign oil policy" for the U.S., the following desiderata:—

> "The American petroleum industry should be encouraged to expand its plans for developing the world's oil resources. This encouragement requires assurance that nationals of the United States will receive the cooperation of our Government in securing a position of equal opportunity with the nationals of other countries . . ."

and

> "The diplomatic support accorded to our nationals by the Government of the United States should be as effective as that accorded to nationals of other countries by their respective Governments."

This emphasis on "effective support", whatever this may mean in practice, is somewhat at variance with the preceding statement on p. 10, which extols the virtues of private enterprise in foreign oil operations, and reads as follows:—

> "Private enterprise can operate with a minimum of political complications, as most foreign countries readily admit foreign capital but few countries, if any, would look with favor upon operations by alien governments."

(6) The big oil corporations are on a par with big business at large whose capacity for doing good or evil is grossly overrated. After 1918 it had become a habit to represent munition makers—"Merchants of Death"—as being responsible for the outbreak of wars. I have always been somewhat doubtful about this theory—brewers may stimulate drinking habits, they don't create them.

Business will always try to make the best of the prevailing current, but the influence of such bigwigs as may be in the limelight does not go beneath the surface of things. It was not the Deutsche Bank which was ultimately responsible for the *Drang nach Osten* and for the Kaiser's Bagdad Railway schemes, nor had the Mannesmann Brothers much to do with what was really significant in the Morocco affair. There is also no evidence to show that bigwigs are necessarily war-mongers. Indeed, have we not heard more than enough of the charge of appeasing tendencies levelled against big business between the wars? The "over-mighty subjects in our midst" are not so powerful after all; they only bring out in strong relief what trend there is in their country—Standard Oil and I.C.I. in their dealings with the Germans were, at the time, faithful exponents of the Coolidge-Hoover and of the Baldwin-Macdonald way of thinking. It is less than fair to look upon them as if they had initiated their policies at the time of Roosevelt and Churchill. A nation has always the species of big business it deserves.

(7) I fully realize that they could not have done so had not the only other big oil power, the U.S.S.R. withdrawn from the international field when its production and consumption (including quantities added to stocks) cancelled each other out in the 'thirties. No understanding on oil affairs after

this war would be worth the effort unless the U.S.S.R. concurs—or at least elects to remain a sympathetic onlooker.

(8) The dissident groups, the comparative newcomers interested in Bahrein and later Saudi Arabian oil—Standard of California, Gulf and Texas—were somehow roped in, although comparatively little is known about these agreements. There were, however, some reports of Anglo-Iranian having acted in liaison between the companies just mentioned and the "senior" interests, Standard (New Jersey) and Shell.

(9) See Selected Bibliography, pp. 165 *et seq.*

(10) See *Petroleum Facts and Figures*, A.P.I., 7th Edition, 1941, p. 16.

(11) C. A. P. Southwell, "Changes in Production Problems" (*The Petroleum Times*, July 8th, 1944, p. 437). There we find a figure of 500,000 wells now in production; of these, 410,000 are located in the U.S.A.

(12) See "American Oil Policy—Anglo-American Issues" (*Manchester Guardian*, July 28th, 1944) and *Petroleum Facts and Figures*, 7th ed., pp. 24 *et seq.* More indicative than the global figure of three tons per day are those covering certain specific areas. The daily average per well was in 1940 ½ ton in Poland and 7½ tons in Roumania, against 25 tons in Venezuela, and no less than 400 tons in Persia.

(13) U.S.A. petroleum exports amounted in 1939 to only 3 per cent. of domestic oil consumption, but to as much as 12.3 per cent. by value of total U.S.A. exports of all commodities (see *Petroleum Facts and Figures*, 7th ed., p. 18 and p. 148). The share of the U.S.A. in the supply of the U.K. amounted in 1938 to 18 per cent., that in the imports to the Continent of Europe to 35 per cent.; both figures are calculated on weights, the share in imports calculated on values is somewhat higher. The quality aspect of U.S. oil exports can be seen from the fact that whereas its share in the total U.K. imports of petroleum, including crude oil, was, as above, 18 per cent. that in imports of finished products only was 21.5 per cent.

(14) The tariff, introduced in 1932 and still in force in 1945, placed an excise tax of ½ cent per gallon on crude and fuel oil, 2½ cents on motor fuels, and 4 cents on lube oils; it was subsequently modified in favour of Venezuela and Mexico. By these treaties certain limited quantities were admitted at reduced rates.

(15) For some details, see Samuel B. Pettengill, *Hot Oil*, New York, 1936, pp. 54 *et seq.* The history of the last ten years has shown that it was these private arrangements which really mattered, with the statutory provision affording the necessary backing for the negotiators, acting on behalf of the Federal Administration.

(16) The only other country whose exports were only partly controlled by the Majors was Roumania. Roumanian oil was, however, of but local importance, and its prices, if they were not manipulated by the big firms, were adulterated by continuously changing export duties.

(17) See above p. 84 for the "control" of the price by the marginal seller.

(18) "Adjustments in Prices of Bunker Oil Supplies: British Auditor-General Outlines the Negotiations" (*Petroleum Times*, May 13th, 1944, p. 29).

(19) He said in 1939:—

> "I do not want to claim for one second that proration is against the interest of the large oil companies. It is *in* their interest; but it is also in the interest of the citizens of the producing areas, and in the interest of the consuming public. It is also most emphatically in the interest of national defence". (*Petroleum-Industry Hearings before the T.N.E.C.*, New York, 1942, p. 538).

Kemnitzer, however, in *Rebirth of Monopoly*, takes the opposite view.

[20] According to S. B. Pettengill, op. cit., p. 53, Mr. Franklin voiced the misgivings of independent producers as follows:—

> "We cannot compete with these foreign oils. They secure their oil lands in millions of hectares . . . and under arrangements through which they can develop their lands without being required to meet offset obligations that we are required to do here. They can operate their wells at half a mile apart and thus conserve their gas energy, and so produce their oil that all that is required is to have some man go out and turn on the supply."

[21] It is somewhat surprising to see recent American publications (The Foreign Operations Committee, op. cit., and a pamphlet by Standard Oil (New Jersey), *Oil for the World*) "sell" the idea of proration to the world at large as if its principles had not in fact been observed abroad long before the U.S.A. oil industry came to realize the drawbacks of their traditional methods.

[22] Such a system, as it was actually established in Poland, is described on pp. 137 *et seq.*

[23] John Ise, *The U.S. Oil Policy*, New Haven and London, 1926, p. 241.

[24] John Ise, op. cit., p. 127.

[25] This, if need be, the various governments can do for themselves now; in *National Petroleum News* of November 22nd, 1944, the U.S. Government-owned Petroleum Reserve Corporation is referred to as a "club with which to keep the British in line."

[26] When written this was not meant to be understood too literally. Since then, however, I have come across a statement of Sir Frank Tribe, Secretary to the British Ministry of Fuel and Power who, in a statement on some government-sponsored enterprise in the Middle East, used the following words:—

> "With one minor exception the whole of the work was entrusted to an oil company, acting as agents of the Ministry of Fuel and Power. They, of course, had all the local experience; they had knowledge of local contractors and of means of getting local labour, which it was by no means easy to get" (*Petroleum Times*, December 23rd, 1944, p. 851).

[27] *Agreement on Petroleum Between the Government of the United States of America and the Government of the United Kingdom of Great Britain and Northern Ireland*, Washington, August 8th, 1944; H.M. Stationery Office, Cmd. 6555, p. 2.

[28] *Agreement on Petroleum*, pp. 3 *et seq.*

[29] Quoted in *National Petroleum News*, October 25th. 1944.

[30] As quoted in *Platt's Oilgram*, September 8th, 1944.

[31] *The Economist*, October 21st, 1944, p. 570.

[32] *The Economist*, December 2nd, 1944, p. 725.

[33] The advent of the U.S.S.R. as a factor in international trade has given a fillip to big business in the "capitalistic" countries. The fact that suppliers as well as customers of Soviet Russia were confronted with *one* single unit of imposing size made it all the more imperative for them to unite in cartels or to leave the field to giant corporations. It is therefore somewhat surprising to see distinguished communist economists like Professor E. Varga blame the capitalist governments for their

> "having encouraged industrial concentration and thus caused great power to pass into the hands of huge concerns by a closing down of smaller enterprise or reducing their role to the production of accessories". (see *The Times*, October 19th, 1944).

Varga's solicitude for small scale private enterprise, which in the U.S.S.R. has been wiped out and superseded by giant (state-owned) trusts, is worth noticing.

(34) In this connection Standard Oil Company (New Jersey) and Socony Vacuum Inc. can, I believe, be considered as one unit.

(35) "The Great Argument Goes On: Another Comment on Trends in U.S.A." (*Petroleum Times*, November 27th, 1943, pp. 639 *et seq.*). The great achievements of the Majors in the technical field and their contribution to research into the fundamental problems of organic chemistry and petroleum technology are not to be underrated. Looking back dispassionately we may, however, find that they mainly took up and developed ideas which were brought to them by men who did not in the first instance belong to their own team. This holds good for practically all the leading lights—for men of the calibre of Edeleanu, of Halle and Egloff, for the men who developed the Winkler-Koch method of thermal cracking and more recently for Eugène Houdry.

(36) This is not necessarily confined to the oil industry, although it is one of its foremost features. That the statement made above (p. 73) about the competition among the railways helping oil monopoly into the saddle is in keeping with the views of leading American thinkers, is shown by the following quotation from Charles R. van Hise, *Concentration and Control*, New York, 1912, pp. 98 *et seq.*:—

> "The illustrations given show that the inevitable consequence of unrestricted competition is bigness and finally monopoly. Even Brandeis, who strongly advocates competition, says: 'Unrestrained competition will lead necessarily to monopoly.' Along the same lines, Untermeyer says: 'The logical outcome of unrestrained competition is legalized monopoly.' Laughlin puts the case that with 'free competition you must inevitably expect to have bigness and also monopoly.' "

(37) *Investigation of Concentration of Economic Power*, T.N.E.C. Monograph No. 21. Clair Wilcox, "Competition and Monopoly in American Industry", p. 14.

(38) George Ward Stocking, *The Oil System and the Competitive System*, Boston and New York, 1925, p. 118.

(39) Joseph E. Pogue, *The Economics of Petroleum*, New York, London, 1921, p. 3.

(40) John Ise, op. cit., p. 239.

(41) An interesting article made available in English by the London "Society for Cultural Relations with the U.S.S.R.," in their Scientific Reprint No. 6 is that by M. A. Kapelyushnikov, originally published in *Vestnik Akademii Nauk S.S.S.R.*, No. 3, pp. 48–66. It deals with "Science and Technology in the Oil Industry". While taking justifiable pride in the achievements of Soviet science and industry, this survey does perhaps less than justice to the role foreign—mainly American—experience and experts have played in the progress of petroleum technique and in the reconstruction of the Russian oil industry.

(42) "Exclusion of profit motive" according to Soviet practice does not apparently imply that individual effort should go unrewarded. What it does mean is that direction of industry is carried on by virtue of a comprehensive and nation-wide plan, and is not left to the considerations of the individual economic unit as to the profit or loss involved.

(43) *Petroleum-Industry Hearings Before the Temporary National Economic Committee*, A.P.I., New York, 1942, p. 516.

(44) I may perhaps be allowed to compare the attitude of the Independents towards the Majors with that of Freethinkers towards the Church. As long as the latter is awe-inspiring and powerful the former may be a useful antidote and corrective. If, however, for one reason or another, the influence of the Church is weakened, the *raison d'être* of anti-religious rationalism seems to disappear. The Freethinkers, sagacious critics though they are, have little

to offer in the way of a tangible maxim for life. Both the words "free" and "independent" indicate a negative bent, not a positive programme.

[45] William J. Kemnitzer, op. cit., p. 227.

[46] See above, p. 69, for the history of an early "Petroleum Producers' Association".

[47] There is an interesting parallel in the past history of a continental oil industry. When, in about 1910, the Polish (then Austrian) crude production had reached a dangerous peak, the industry in its plight called in the help of the government and persuaded a Ministry to build an emergency topping plant, designed to supply the railways with fuel oil. As matters stood there and then nobody but the government could have undertaken that job. The phase of over-production soon passed, but the State-controlled plant, now grown to the stature of a complete refinery, had come to stay, and it remained ever after a thorn in the flesh of the privately-owned undertakings.

[48] As quoted in Allan Nevins' *John D. Rockefeller: The Heroic Age of American Enterprise*, New York, 1940, Vol. I, p. 622.

[49] Inefficiency of governmental agencies as compared with private undertakings is a popular topic in certain circles, but things are not as simple as all that. Red tape has become a permanent feature of many big firms which are certainly no less, and possibly more, bureaucratic than bureaucracy. Also, inefficiency within a system of private enterprise is sometimes covered up by restrictive agreements or by natural monopolies, traditional buying habits, etc. Even if competition is "perfect", there is the waste and the distress caused by the downfall of the least efficient competitors, but these facts are less in the public eye than the mistakes of public enterprise, which *is* everybody's business. On the whole, Mr. Ickes was right when, talking to an A.P.I. convention, he said:—

> "How often have we seen men become highly indignant as they discuss the waste and inefficiency of public management of business affairs. And yet I venture to remark that no Government business at any time has been so wastefully and inefficiently conducted as is the oil business today. I refer particularly to the marketing phases of that business." (Quoted in S. B. Pettengill, op. cit., p. 256.)

[50] As quoted in A. Nevins, op. cit., Vol. II, p. 545.

[51] For the theoretical problems involved, see Joan Robinson's admirable book on *The Economics of Imperfect Competition*, London, 1933.

[52] *The Times*, August 21st, 1944. Article on the "Lessons of the Inter-War Period," from a Special Correspondent.

[53] P. Lamartine Yates. *Commodity Control: A Study of Primary Products*, London, 1943.

[54] The case of *laissez faire*, based on the classical teaching of Adam Smith and David Ricardo, has been re-stated in our time by L. Mieses, an economist of great vision, whose criticism of the Socialist thesis has to be taken seriously, whatever one's outlook may be. Such tradition has been carried on in Great Britain by Lionel Robbins (*Economic Planning and International Order*, London, 1937), and by F. A. Hayek in his stirring challenge to any sort of totalitarian system in his widely-read book, *The Road to Serfdom*, London, 1944.

[55] A survey of these problems is to be found in *Progress Report on Standard of Allocation of Oil Production Within Pools and Among Pools*, by the Special Study Committee and Legal Advisory Committee on Well Spacing and Allocation of Production of the Central Committee on Drilling and Production Practice, Division of Production (A.P.I., Dallas, Texas, 1942). There still remains the wider problem of proration which—like peace—is indivisible. Reticence in the exploitation of one well is made possible by imposing the same regime on all participants in the "pool". One pool,

however, cannot be prorated unless other pools are similarly controlled. Should it be otherwise the main benefit would be derived by those who have not participated in the sacrifices involved. It follows that proration to become effective must be on a global scale.

(56) An account of this venture was given by Mr. D. S. Wandycz, one time Managing Director of the statutory organization charged with the regulation of the Polish oil industry (P.E.N.), in a paper read in 1944 before the Association of Polish Engineers in Great Britain, an extract of which was published in *Petroleum Times* on June 10th, 1944.

(57) See the British White Paper on *Employment Policy* (May, 1944, Cmd. 6527) for references to distribution of industry and labour, capital expenditure, stability of prices and wages, etc. That things are more or less the same in the U.S.A. can be seen from a *Times* despatch from Washington (July 29th, 1944):—

> "What are the American people going to demand when the war is over? . . . Thus far the only national purpose as single as the winning of the war seems to be full employment. . . ."

(58) A tug-of-war between producer and consumer countries should, however, be avoided at any cost. What happened after the dissolution of the Austro-Hungarian Empire in 1918 is a pertinent object lesson. Then Poland barred the export of crude whereas Czechoslovakia—to keep its refineries going—impeded the import of finished products. In the end Polish semi-finished material had to be adulterated so as to give their opposite numbers across the border a chance to do once more the whole job of distilling. Similar conditions prevailed in respect of Roumania and Austria. A description of this peculiar set-up is to be found in my article on "Oil Transport and Post-War Reconstruction in Europe" (*Petroleum Times*, January 6th, 1944), which also contains suggestions for a continental "oil grid".

(59) Throughout the history of petroleum the "gap" between the value of crude and its derivatives has widened. Not that the finished products have gone up in price—it has been the other way round—but the degree of good use made of a barrel of crude has increased manifold. Originally lamp oil was *the* product. Most other fractions were a nuisance, or at best passengers. To-day only residual fuel oil (narrowed down anyway by the cracking technique) is being sold at a price lower than crude. Furthermore, recent developments have brought forward processes by which chemicals can be produced whose high price greatly affects the difference of crude and product values, if only for limited quantities. The widening of this "gap" can perhaps best be exemplified by a comparison of capital requirements of the various processes, as they have come into use. V. L. Nelson, in *The Oil and Gas Journal*, June 25th, 1942, gave the following figures:—

"

Processes	Capital Cost per Barrel Daily Capacity
Complete Topping Plant	$100–150
Complete Refinery	$250–400
100-octane Gasoline	$900–1,400
Synthetic Rubber	$20,000–27,000

"

For earlier comparison, see Campbell Osborn, *Oil Economics*, New York and London, 1932, p. 140. There it is shown that cost of plant operation, sales cost, and interest and depreciation are as follows:—

"Skimming $0.32
Skimming and cracking $0.72
Skimming, cracking and production of lubricants.. $0.97
} per barrel of crude run to stills"

(60) G. Tugendhat, "Oil: An Additional Basic Material for the British Plastics Industry" (*Journal of the Institute of Petroleum*, Vol. 29, No. 231, March, 1943), and Dr. F. Kind. "Petroleum Refining: A Chemical Industry" (*Chemistry and Industry*, May 6th and 13th, 1944, Nos. 19 and 20, pp. 170–172 and pp. 182–184).

(61) "Public convenience and economic necessity may demand that public service companies enjoy monopolistic privileges; but it is certainly imperative that any such monopoly be subjected to strict regulations in the public interest" (article by R. E. Cushman on "Public Utilities" (*The Encyclopedia Americana*, 1937, Vol. XXII, p. 780).

(62) Much of the argument in the vast American literature on Public Utilities centres round legal, especially constitutional, niceties which have but little to do with the problems themselves. The same observation applies to the greater part of the discussions about the role of the government in the oil industry; it is not always easy for the stranger to realize that "interference" by State Governors may be gladly accepted, whereas similar action, if it originates in Washington, is looked upon as a sort of sacrilege.

(63) See above, p. 39 *et seq.*

(64) G. Lloyd Wilson, James Herring, Roland B. Eutsler, *Public Utility Industries*, New York and London, 1936, p. 8.

(65) "It is a common practice of the major oil companies to exchange gasoline with each other. All majors exchange gasoline, except Sun Oil Co. This is usually done when a major finds it advantageous to obtain gasoline on an exchange basis from another company rather than to make shipments from its own sources. Through these exchanges transportation costs are saved. The principle is that a major supplies other majors gasoline for their marketing outlets which are near his own refinery in turn for gasoline needed at his own marketing outlets which are located at distant areas. The amounts exchanged usually balance out at the end of the year. It is not exchanged on a price basis. Supplies so received are usually sold under the brand name of the receiving company" (*Investigation of Concentration of Economic Power*, T.N.E.C. Monograph No. 39; Roy C. Cook, "Control of the Petroleum Industry by Major Oil Companies", Washington, 1941, p. 35.

(66) We take the services of a genuine Common Carrier, e.g. the Post Office, so much for granted that we hardly pause to realize how essential they are for safeguarding the equality of citizens. The breakdown of communications in the wake of this war when one had to have much money or know the ropes to get a message through, shows what happens if transport becomes a matter of "individual arrangements".

(67) American readers will find a description of how the British Petroleum Board functions in W. C. Platt's series of despatches from the European theatre of war in *National Petroleum News*, especially those of November 22nd and 29th, 1944.

(68) I have dealt with some problems of the future of war-time pipe-line networks in an article, "Thoughts on Pipe Lines in Britain" (*Petroleum Times*, February 3rd, 1945). One can, of course, use a pipe-line system for different products without danger of contamination, but the full benefit of such a joint venture will not be derived, unless we go the whole hog and have stocks pooled. In my article I have dealt with objections likely to be made by some marketers:

> "The fact that a policy of exchanging supplies was firmly established provides also the answer to those who may be inclined to deny the possibility of pooling transport in view of differences in quality and the desire of some distributors to make the petrol consumer as 'brand conscious' as the oil buyer has been for a long time. There is, however, not much evidence of any real success of this 'educational' campaign,

and should supplies for Great Britain be drawn from overseas, as they well may be, on the strength of international arrangements not necessarily in line with the pre-war policy of the major importers, the reasons for keeping each 'brand' separate would become more flimsy still. There should, however, be no difficulty in handling one premium quality alongside the ordinary one and distinguishing dopes could be added at the final stage."

(69) Mr. William Beard, the author of a book on *Regulations of Pipe Lines as Common Carriers*, New York, 1941, which I had not seen at the time of writing this chapter, comes to similar conclusions. I particularly draw attention to his final chapter, pp. 148 *et seq.*

(70) G. W. Stocking, *The Oil Industry and the Competitive System: A Study in Waste*, Boston and New York, 1925, p. 313.

(71) *Parliamentary Debates* (*Hansard*), *House of Lords Official Report* (Unrevised), Voi. 132, No. 67, Wednesday, 5th July, 1944, col. 683. In the same debate Lord McGowan (Chairman of I.C.I.) said:—

"In this country, many manufacturers have ceased to believe in the inherent superiority of free or extreme competition, and have moved successfully a long way in the direction of co-operation in industry and central action by the Government."

(72) Sir William Beveridge, *Full Employment in a Free Society*, London, 1944, p. 23.

APPENDIX I

TRANSPORT COST AND THE PRICE OF MOTOR SPIRIT

"THE price of gasoline at the refinery is less than one-third of the final selling price", says Dorsey Hager in his description of the American Oil Trade.[1] In the following table, which is based on Hager's figures, the transport components are set out separately as I have estimated them:—

	Cents per U.S. Gallon	Part attributable to Transport
Refining Price	6	0.5
Freight Rate (Average) ..	3.6	3.6
Distributors' Spread ..	2 }	3.3
Retail Spread	3 }	
Taxes (State), Average ..	3	—
Taxes (Federal)	1	—
	18.6	7.4
Less Taxes ..	4	
Untaxed ..	14.6	

The assumption that the refinery price includes ½ cent for crude transport is based on a publication by leading Standard Oil (N.J.) experts.[2] They calculate average (East Coast) transport cost of crude to the refinery as 45 cents per barrel, or ½ cent. per U.S. gallon based on an aggregate 50 per cent. yield of gasoline. It is further estimated that the cost of handling and shifting petrol inclusive of storage is responsible for two-thirds of the wholesale (distributor's) and the retail spread, leaving the balance for costs of strictly commercial nature, and profit. The table shows that *transport factors amount in U.S.A. to about* 40 *per cent. of the price inclusive of tax, and to more than* 50 *per cent. of the price for the material proper.*

To estimate the equivalent proportions in the case of the price for petrol in the United Kingdom we have to analyse the c.i.f. price first. The following table shows its break-up for imports from U.S.A.:—

	Per Long Ton	Part Attributable to Transport
Average pre-war value motor spirit c.i.f. U.K. £5 at $4.70	$23.50	—
Average ocean freight, insurance, leakage	3.50	$3.50
F.o.b. value	$20.00	
Estimated cost of transport from refinery to deep sea tanker, including handling at shore installation and transport of crude oil to the refinery at 50 cents per barrel or		$4.40
		$7.90

Cost of transportation thus amounts to one-third of the c.i.f. price.

The retail position in England immediately prior to the outbreak of this war is analysed in the following table:—

	C.i.f. Price	Duty	Transport Factors	Commercial Factors
Combine price per Imperial gallon No. 3 Petrol, ex pump 1s. 5d. ..	4d.	9d.	3d.	1d.
	24%	52%	18%	6%
Same, untaxed, 8d.	50%	—	37%	13%
Same, but percentages adjusted to allow for the fact that one-third of c.i.f. price, i.e. 1.33d., is the transport component of the c.i.f. price	33%	—	54%	13%

It is fully appreciated that these figures represent only a rough estimate, especially as far as the split-up of "transport" and "commercial" items in the distribution and retail sphere is concerned, but they are probably not very far out, it being well known that the commercial profit from the sale of No. 3 Spirit was very small during pre-war years. Even allowing for a wide margin of error the tables show the paramount importance of the transport factor; if this is so in U.S.A. and in the British Isles, it can be expected *a fortiori* that it would be found to be accentuated in certain countries on the Continent.

Incidentally, that transport is responsible for more than half of the untaxed retail price does not mean that conveyance of petrol is particularly costly, which is hardly the case, but reflects the fact that petrol at the refinery is so very cheap.

NOTES AND REFERENCES

[1] Dorsey Hager, *Fundamentals of the Petroleum Industry*, New York and London, 1939, p. 357.

[2] R. T. Haslam, F. M. Surface and J. R. Riddell, "Cost and Cost Reduction" (*National Petroleum News*, Vol. 45, No. 9, March 3rd, 1943, p. 30).

APPENDIX II

NOTE ON THE ECONOMICS OF TANKER SHIPMENTS

The following Note is an almost verbatim reprint of an article published in *Petroleum*, August, 1944, VII, 8, pp. 141 *et seq.*

THE demand for a multi-purpose tool or material is likely to be governed by the law of averages, and so the problem of keeping adequate stores of an article that can be used for various ends is easier than the stocking and supply of specialized items: a general-purpose article will probably not be required for *all* its uses at the same time. Single-purpose parts require self-contained stocks of their own which in the aggregate are bound to amount to more than would a common pool for several uses.

TANKER'S SPLENDID ISOLATION

The same relation obtains between general-cargo and specialized ships. The latter are much more "critical," because there is no means of drawing upon a vast number of vessels in case of need or of disposing of surplus tonnage in favour of other potential cargoes. The tanker is the specialized ship *par excellence*, a feature brought out in full relief during this war: it is not always appreciated that the U-boats singled out tankers for their attacks, not just because the Germans were aware of the importance of petroleum for the war effort, but because they must have realized that a tanker was more difficult to replace than a ship carrying guns or shells. Assuming that the real target was not so much the actual cargo—ships were often attacked when sailing in ballast—but the carrying capacity, it is obvious that the loss of even a great number of *general*-cargo ships never seriously endangered the future supply of goods of *first* priority, since it was always possible to fall back on similar ships which had so far been used for less vital goods. Perhaps it may be put this way: any such ship, whatever her actual cargo, when torpedoed, was a potential carrier of tobacco and not of munitions. The case of the tanker was different; there one could not reshuffle the programme, except by reducing the supply of similar material for other destinations, i.e. a tanker sunk meant, over a period of a year, the loss on the battlefield of six to eight times its carrying capacity.

This war-time picture is indeed representative of most of the essential features and of the economics of tanker shipment in times of peace. The fact that *the tanker market is self-contained* has far-reaching consequences, akin to those we have detected in other spheres of the realm of oil where the specialized equipment required for handling a liquid has created a certain set of circumstances, and we are once more faced with the fact of oil transport being a one-way traffic allowing of no return trip with a pay-load.

"The narrower the field, the steeper the curve"—the equivalent of the cramped tanker position in war-time are, in peace-time, violent market oscillations: the absence of safety valves makes for soaring freight rates whenever a sudden demand crops up, since additional supply is subject to the time lag of shipbuilding, and also for marked depression whenever there is even a brief dearth of cargoes.

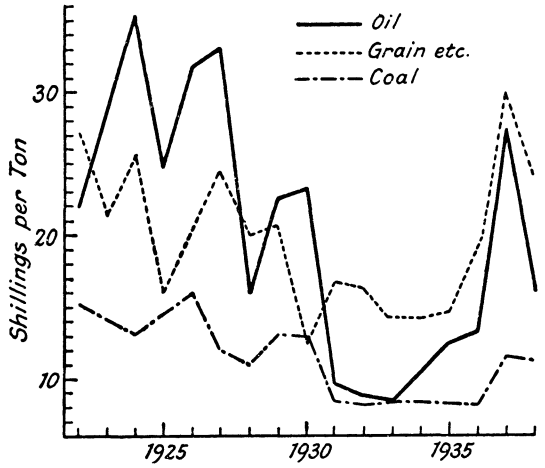
Alternative uses of tankers for transport of goods other than petroleum[1] are oddities, exceptions which appear to prove the rule. At the other extreme there is, however, always the possibility of transporting limited quantities of lubricants or fuel oil in deep tanks of general cargo vessels.

UPS AND DOWNS

In a paper published in 1943 I pointed out:—

> "Tanker freights are much more erratic than most other freights since there is no emergency exit: if a shipper cannot get a tanker he cannot move, or get, his oil—that means he will go to the upper limit of his calculation; and if, on the other hand, the tankship owner has no oil to carry he cannot look elsewhere for a cargo—single cargoes of molasses and edible oils do not influence the market—and the rock-bottom freight rate is therefore determined only by his minimum cost, not, as for other ships, by alternative opportunities of employment."[2]

This position is brought out clearly in the following graph in which the fluctuations of tanker freights (clean, Gulf–U.K./Cont.) are compared with those of coal freights (Cardiff to Rio de Janeiro) and with those for such speculative types of cargoes as are grain, seeds, rice, and sugar (La Plata to United Kingdom). It is based on yearly average figures, compiled for tankers by T. Koopmans,[3] and for the other commodities by the *Daily Freight Register*, London. In the course of sixteen years the variation of the lowest freight from the highest was for coal 50 per cent., for grain 57 per cent., but for clean tankers as much as 79 per cent.[4] A diagram based, as this, on yearly averages fails to bring out the steepest aspect of the tanker freight curves; could it have been based on



monthly average figures it would have illustrated the fact that whereas the highest tanker freight recorded (average for April, 1927) was 50s., the lowest (average for September, 1933) was only 8s.—*a drop of no less than* 84 *per cent.*

OIL COMPANIES' SHARE

I have had occasion to mention another aspect of the specialized character of oil tankers when dealing with other means of oil transport: tankers have been developed under the auspices of oilmen, and a very considerable part of the tanker fleet as it was in being at the outbreak of this war was actually controlled by the oil industry itself. According to Koopmans[5] more than 50 per cent. of sea-going tankers were owned by oil companies, practically all of them belonging to the category of "Major Companies."[6] About 10 per cent. consisted of tankers controlled by various governments and of ships usually carrying molasses and similar materials, while less than 40 per cent. were run by owners who had no direct interest in petroleum. These figures are, however, not necessarily representative of tankers operating internationally, since they include a considerable number of tankers under the United States flag almost exclusively engaged in United States coastal traffic, which was closed to ships of foreign flags; this resulted, on the other hand, in very few American ships trading outside their coastal waters. There was thus not one tanker market

but two—which were not closely linked, their ships not being readily interchangeable.

This factor and the fact that a considerable part of the tonnage owned by non-oil firms was on long-term charter to major shippers, making the owner for all intents and purposes an agent of the shipper, caused the actual market in which the "basic" freight rate—Gulf/U.K.–Cont.—was hammered out to be still narrower than one would have expected from the general considerations mentioned at the beginning of this Note.

VOYAGE CHARTERS

There do not appear to be published figures available showing the percentage of cargoes which were covered by voyage charter parties, and thus subject to what is called the "market freight", but it would be surprising if it had amounted to much more than, say, 10 per cent. of actual loadings. Apart from tankers owned by oil companies, whose economics were determined by running cost, interest, and depreciation, all of them reasonably stable, a substantial part of the fleet of "free" tankers was taken on time-charter terms by shippers who could boast a turnover sufficiently large and constant to justify long-term commitments. Time-charters, which may have been arranged for any period from six months to ten years, are still fairly variable so far as rates are concerned, but to a much lesser degree than single voyages. Koopmans[7] reports that during the period 1923–38 the rates for five- to ten-year contracts for motor-ships varied only between 5s. and 7s. 6d. (per month, per d.w. ton), contracts for shorter periods being more reactive but less so than single-voyage freights.

The importance of the freight payable for single voyages is, however, infinitely greater than it would appear from the statistical angle: if we accept as a rough approximation the thesis that the price of petroleum products will depend on competition of actual and potential suppliers, it is fairly evident that sellers holding the bulk of a market will tend to supply at prices which give not too much scope to intruders.

On the other hand, as long as the Majors are not fighting each other, they have little incentive to quote prices much below the "danger mark" represented by the cost of equivalent material which could be supplied by a newcomer. This is in line with economic theory maintaining that the actual price which is paid in a market depends to some extent on the "marginal" supplier. *It is true to say that the voyage tanker freight, a vital part of the*

interloper's price build-up, is a controlling factor even if it is payable on not more than a fraction of total shipments.[8]

Only if these principles are fully realized can we understand the forces which are instrumental in shaping developments in tanker markets.

"FREE" OWNERS

Tonnage available for carrying petroleum overseas originated mainly from two sources: from fleets owned and managed by the big oil companies and from "free" shipowners who had made it their business to cater for the oil trade.[9] As to the latter, one is inclined to wonder how so considerable a tonnage of that kind could have been built, seeing that the requirements of independent importers were of a much lower order. The reply to this query would probably be that the Norwegian tanker fleet was developed at a time when it was believed that the Russians, who had no deep-sea tanker fleet of their own, would take an expanding share in world oil exports, and also that the major companies were not in principle adverse to the idea of making use of "free" tonnage themselves. The reason for this policy and its implications has been lucidly expounded by Koopmans. He says:—

> "The question naturally arises why the big oil companies do not use, or have so far not used, their financial power to expand their own tonnage to such an extent that independent owners would be entirely forced out of the tanker trade, or would have been prevented from entering it. . . . Some reflection will show that in certain respects the existence of a margin of independently owned tonnage constitutes an advantage also to the big oil companies. The tonnage requirements of individual oil companies are subject to even greater relative fluctuations than those of all oil companies together. Changes in the output of fields, the opening-up of new fields, changes in demand for oils in consuming countries, whether for utilization or for storage, strikes in ports or oilfields, wars or threats of war—these and other factors have an often unpredictable bearing on a given oil company's need for tanker tonnage. For an oil company the maintenance of a tanker fleet which is sufficiently large to meet any situation which may arise by means of its own ships would involve the cost of maintaining a considerable average of unused tonnage. . . .
>
> "Thus, the independently owned fleet represents a kind of reserve on which oil companies may draw in order to meet in an efficient way fluctuations in their individual tonnage requirements."[10]

In the circumstances, the Major companies are prompted by somewhat incompatible interests: on the one hand, they wish to buy in a cheap market when they charter "free" tankers; on the other, they are far from wanting to depress the market unduly lest their smaller competitors who have no ships of their own and

are less tied up by long-term time charters should reap the benefit. Koopmans has shown [11] that when the shipping and trading interests of the Majors clash the traders have it every time—that is to say, the Majors have the tendency of being "bullish". They will, generally speaking, like to see time-charter rates (especially the short-term species) somewhat above the level of cost of their own fleet, with voyage charter freight considerably higher still. They will be particularly pleased to see an occasional "peak" of rates which would hit the casual charterer hardest and might result in his being driven out of critical markets with poor prospects of re-establishing himself when the storm has blown over. As a matter of fact, the scales are weighted against him anyway: whereas it happened quite often that voyage charter freight rates were many times that of average time-charter rates in being, they were very rarely below the level of long-term charters.

TANKER POOL

It seems obvious that a policy of freight rate maintenance would be utterly impracticable if it were not for the fact that—as I mentioned at the beginning of this Note—the tanker market is self-contained, an inland sea, as it were. If a high level of freight rates could have attracted ships previously used in other trades it would have been senseless to try to "nurse" the market, and, even as it was, the probability of a rush to build new tankers made it impossible to fix freight rates on too remunerative a scale. These features have actually fashioned the history of the International Tanker Owners' Association, commonly called the Tanker Pool, which began to function in May, 1934, and continued up to the outbreak of war. This association of virtually all free owners, who agreed to pay part of their earnings per voyage into a common pool designed to reimburse owners who laid up their ships, rendered it possible to keep up the standard of rates by relieving the pressure of competing tonnage. The inherent danger, however, was that the building of new tankers might have been encouraged to such an extent as to swamp the market and to throw the whole machinery of the pool out of gear. As it was, the final test never came because of the outbreak of war, but it is worth noticing that the Pool's remarkable success was mainly due to the helpful attitude of its very customers, of the Major companies, whose decision not to charter vessels outside the Pool formed its linch-pin.

THE FUTURE

All these issues seem to be past history, but they are also of absorbing interest for the future. When the shape of international oil trade after the war comes to be decided, tanker shipments will be one of the vital points on the agenda. Should there be a basic international understanding on the production side, marketing will tend to be still less competitive than it was in the 'thirties, and shipping will develop accordingly. Moreover, the ascendancy of the Near East and the ensuing possibility of each hemisphere being able to satisfy its requirements by drawing upon its own resources may alter the whole structure of tanker shipping.[12]

These are problems which require and deserve much thought; considerable work of compiling data and of sifting contradictory claims is still to be done. The points that are likely to matter, however, were foreseen by Koopmans as early as 1939. In his book he sounds a warning that control of new construction would

> "imply the abandonment of the principle of free entry into the trade, and would require some criterion for selecting the privileged owners to be allowed a share in the safeguarded profits of the tanker trade."

He depicts the

> "great difficulties that will be involved in finding a criterion that is effective in the long run, and permits a compromise between the many conflicting interests, i.e. national interests, and those of rival owners, rival oil companies, and others,"

and he concludes on a topical note by saying that

> "though many specific features of the tanker trade determine the form in which this dilemma appears, it is essentially in line with general tendencies in other sections of our economic system in its present phase."[13]

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[1] Some such alternative uses were listed in *Petroleum*, June, 1944, p. 89. An interesting report on a Swedish design for "Tanker/Ore Carriers" was described in *Petroleum Times*, October 14th, 1944, pp. 676 *et seq.* Marcus. Samuel's "Shell" experimented with using tankers for return cargoes, and the Japanese with shipping silk in eastbound tankers; it didn't work in the long run.

[2] "Oil Transport and Post-War Reconstruction in Europe" (*Petroleum Times* 1943, 47, p. 712).

[3] Dr. T. Koopmans, *Tanker Freight Rates and Tankship Building: An Analysis of Cyclical Fluctuations*, Haarlem and London, 1939, p. 190.

[4] It is not surprising that freight rate indices comprising a wider range of commodities and a great number of routes show fluctuations even smaller than those for coal and grain; the lowest freight rates paid during 1925–36, as shown by comprehensive indices, are only 30–35 per cent. below the highest (L. Isserlis, "Tramp Shipping, Cargoes and Freights," *Journal of the Royal Statistical Society*, 1938, 101, Part I, pp. 75, 78 and 122).

[5] T. Koopmans, op. cit., p. 6.

[6] American sources (*Elements of the Petroleum Industry*, edited by E. de

Golyer, New York, 1940, p. 326), give a figure of 56 per cent. of tankers of all flags for vessels owned by oil companies. The proportion of tankers controlled by major companies in the U.S. tanker fleet appears to have been higher still—i.e. 87 per cent. if the data given on p. 28 of Monograph 39 presented to T.N.E.C. (Washington, 1941) are correct.

(7) T. Koopmans, op. cit., pp. 194 *et seq.*

(8) See p. 84 of this book for the equivalent in the price build-up of petroleum products.

(9) The expression "free" rather than "independent" shipowners (as they are called by Koopmans) is used here for owners who have no immediate interest in the oil business proper. To oil men the expression "independent" has, ever since the early days of the industry, come to mean the competitors of Standard Oil, and later of the bigger groups in general. The Independents in this sense of the word have, however, never had control of any significant tanker fleet.

(10) T. Koopmans, op. cit., pp. 142 *et seq.*

(11) T. Koopmans, op. cit., pp. 37, 137 *et passim.*

(12) P. H. Frankel, "Hemisphere Supplies—Tankers' Future" (*Petroleum Times*, 1944, 48, p. 153).

(13) T. Koopmans, op. cit., p. 172.

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The *italic figures* in brackets refer to "NOTES AND REFERENCES."

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Semantic Note:

When writing 'Essentials' I used throughout the term "motor spirit" which, outside the U.S.A., was then widely used in a formal context, although the vernacular term in the U.K. and parts of the Commonwealth was "petrol". In this up-dating exercise I have settled for the, originally American, term 'gasoline' which, currently used over much of the world, is understood everywhere.

P.H.F.

ESSENTIALS REVISITED 1968

The basic argument on which this book was based has stood the test of time: the oil industry's main features - its low price elasticity of supply and its limited price elasticity of demand - has continued to result in an industrial structure in line with its inherent needs.

On the supply side the extreme relation of fixed to variable cost persists. As a matter of fact, in the last twenty years a number of other industries have progressively adopted High Investment/Low Variable Cost patterns and my oil-industry type of analysis has become relevant for a substantial part of contemporary industry – *vide* J. K. Galbraith's recent writings. [1]

The high fixed-cost element of the refining, transport and marketing stages is reinforced by the risk factor in exploration and production. In this respect the sum total of one's efforts, much of which have led nowhere, takes on the character of fixed cost of the successful ones; this is accentuated by the fact that crude oil and natural gas exploration/production is exactly the reverse of coal mining ventures. Whereas it is comparatively easy and thus cheap to locate coal seams, it is very costly to bring coal to the surface; it is difficult and thus expensive to locate petroleum hydrocarbons in the subsoil, but once detected by the drill they tend to rise to the surface under their own steam, as it were, and in quite a few fields even without a great number of wells having to be drilled.

Consequently there is an overwhelming inducement to recoup one's investment to the maximum possible extent and as quickly as possible since, within certain limits, the prime cost of every barrel of oil is low and, in many cases, lower than that of the previous one - a case of decreasing costs. These circumstances and not just the, by now forgotten, Law of Capture, featured on p.18 *et seq.*, influence the oil producer at all times.

The motivation of the initial phase of the oil industry which influences the behaviour in the subsequent ones - refining, transport and marketing - now known as "downstream operations" - is enhanced by similar ones affecting them directly: the analysis of refining cost Part 2, chapter 3, is still valid today and the "last 10 percent of a refiner's capacity" have since been christened the "incremental barrel".

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[1] John Kenneth Galbraith, Reith Lectures, 1966 (British Broadcasting Corporation) and The New Industrial State, Hamish Hamilton, London, 1967

Only one thing has become clearer since: because it takes only two years to build a refinery but, say, ten years to develop a market position, especially for gasoline, and because it may take an infinite amount of time (and money) to find the oil, refining - in contradiction to the historical position described on p.71 - is not now "a bottleneck": it provides no point of control; countries where such a status seems to be attached to refineries are those with a refinery licensing system and there it is the licence which matters, not the plant.

Backed by the experience of the inter-war situation, which was dotted with cartels which culminated in the As Is agreement (p.92 *et seq.*), I was thinking in terms of combinations of operators to achieve market stability. The postwar extension of U.S. Antitrust conceptions to the world at large, which was due to the comparatively new doctrine that U.S. companies had to comply with them also in dealings which did not touch the U.S.A., and also to the adoption of similar tenets in several other countries, had its distinct effects: my verdict (p.94) that "cartels and trade associations are the middle-class version of trusts" proved correct. The postwar period did not generate new spelled-out "Combines", to use a now defunct term (see p.XV), but a set of conditions obtained which for some considerable time were extremely favourable for a limited number of very large companies. I shall presently deal with these developments, here I only want to lead up towards a short rēsumē of the compelling economic motives for concentration in a high-risk and high-fixed-cost industry.

If you have one oil well into which you have put all the money you have got and it is a "gusher", you have hit the jackpot and are bound to get very rich. If, however, as is more likely than not, such a solitary well is dry, you are bankrupt and don't get a second chance. If, however, you have ten wells - or better still a hundred wells - preferably not only in one field or in one region, or in one country, the odds are that, even if you know your business, a substantial number of holes will be dry; but a few will be economic producers and, if you are lucky, one or two will be outstanding. Obviously the failures and the middling wells dilute the profits gained from the best ones, but it is obvious that this *diversification of risks* greatly increases the chance of survival, i.e. the future opportunities for profitable operations.

This spreading of risks is in line with the age-old principle of assurance companies: no one is sorry to have paid the insurance premium even if the incident against which protection was sought has not materialised.

This spreading of risks, vital in the aleatory phase of exploration, is also a substantial advantage "downstream". If you have only one refinery, or market only in one locality, you may be irremediably and fatally affected if economic and/or political conditions there turn out to be unfavourable for any length of time. If, however, you operate in a

number of places, or countries, or regions or hemispheres, the odds are that adverse conditions at one point are balanced by better results at another. By being able to *average out* the bad with the better you manage to remain in business long enough to be still there when the tide turns in the trouble spot.

Thus the emergence (by growth and agglomeration) of very large economic units in the oil industry is due to their capacity for survival in the face of local difficulties - this is safety in numbers.

This problem of safety by way of diversification has yet another dimension: by operating on more than one level of the industry, i.e. by integration, the investment in each one of them is made more secure. Mr. Farish's 1939 statement quoted on p. 76 is still a valid description of the motives which led to a crude oil producer wanting to become a refiner and rendered it attractive for a refiner to take up a position as a marketer, selling a branded product to the ultimate consumer.

There are in fact two aspects of the security for which the operators, seeking full employment for their investment, must needs be striving:

There is, *vide* Mr. Farish, first the element of assured outlet for the supplier and of assured supply for the offtaker, but there is also the advantage of being able to average out the profitability of, respectively, production, refining and marketing (and of transportation where applicable). It has been the experience in the U.S.A. (and for different reasons in the Middle East) that the producing phase of the industry provides a higher return (after tax) per dollar invested than do the subsequent phases of the industry; in France, for reasons inherent in the government-determined structure of its oil industry, refining is a more rewarding affair than is, for instance, marketing.

It can be said that an enterprise involved in all phases of the industry has a greater prospect of economic survival than have those working on one or two levels only. Hence, in our day, the rising tendency for international producers to absorb national refiners and marketers. This is an almost inevitable process when a crude oil producer can offer the refiner-marketer's shareholders a good deal more for their equity than would be justified by the profitability of the enterprise to be taken over. This becomes possible if the acquiring company puts into the calculation some of the crude oil profits which might never be made in the absence of the incremental outlet which control over the "down-stream" position could provide. Hence the saying that such companies could not survive on their own since they were worth more dead than alive.

I shall be dealing later with the more recent repercussions of the structure of the oil industry on the price problem and of the influence brought to bear on it from the outside. This up-dating of the original findings will best be carried out when the current policies of and for the

industry are being reviewed, but we must first look at the influence the nature of demand has had on the market structure for oil products.

Part III, chapter 1, stated that demand for oil had but limited price elasticity, and the description of the repercussions of price *changes* on gasoline demand still holds good; as the, now still higher, excise taxes on motor fuels prove, large-scale consumption is not precluded by a high price of gasoline – witness the rapid recovery of demand even after massive tax increases. What is true, however, is that the longterm level of prices has some considerable influence on the size of engines and therefore on the aggregate of gasoline demand.

For non-gasoline products – which were, a quarter of a century ago, of but secondary importance – the situation is entirely different. Whereas gasoline had "no serious competitors" (p.55) but was on the other hand confined to its preordained market and could grow only with it, the heavier parts of the barrel of crude – middle distillates and residues – had at their doorstep the vast market for home heating and industrial fuel hitherto covered by coal. Although the amenities of using a liquid (see p.13 *et seq.*) played a significant role – hence the early progress of oil bunkers in the face of lower coal prices – the great leap forward in the postwar period was mainly due to the fact that (outside the U.S.A.) coal prices, being wage-determined, went up and up, whereas oil, helped by the stupendous discoveries of low-cost crude, became progressively cheaper. Thus we can say that for part of the barrel a high degree of price elasticity can be envisaged – at least it exists during the conversion period from one source of energy to the other. Once that conversion has been carried through, the competition of alternative fuels, e.g. in home heating, becomes less immediately relevant. The position is different though where dual-firing systems have been installed and there (mainly at the East Coast-U.S.A. utilities) relative prices play a great and almost instant role in the market pattern.

Since 1945 the process of substitution of coal by oil has gathered momentum almost everywhere. Outside the U.S.A. it was accelerated by coal becoming dearer as time went on, since the higher wage bill could only to a limited extent be compensated by technological progress, whereas oil got cheaper due to the discoveries of crude oil reserves whose costs were but a fraction of what they were in the U.S.A. on whose prices world market quotations used to be based.[2]

Now, however, oil is no longer the Last Frontier of progress in the energy field; natural gas and atomic energy are growing faster and oil – especially fuel oil – is now in a defensive posture to which we were not

[2] See Wayne A. Leeman, "The Price of Middle East Oil: An Essay in Political Economy" (Cornell University Press 1962 and Oxford University Press).

used hitherto. On the other hand, the chemical industry has become altogether petroleum borne and is now an integral part of oil industry planning.

The transport business remains, however, the 'heartland': the railways have joined road transport as oil's virtually unsubstitutable market and there is as yet no clear sign that an alternative power for propelling vehicles and aircraft will be developed for some considerable time to come.

The fact that the refinery turns out what is called 'joint products' – By-Products All on p.59 – is still almost as relevant as ever but the difference in the realisations between the three main products has shrunk: gasoline is no longer quite the premium product it used to be and the "discrimination" which loomed large on p.60 *et seq.* is no longer what it used to be. The smaller overall margins are, however, acceptable because of the economies of scale which the industry has been able to achieve.

The item on "where to build refineries" (pp.139/140) proved to be prophetic: after 1945 there was a rush to build refineries in consuming countries; governmental influence was prevalent in some cases but the industry itself soon found out that, once all parts of a refinery's yield could be placed locally, it was economic to build it as close as possible to the ultimate customers.[3]

Whereas the basic approach in Parts II and III of the book stood the test of time all along, the more political aspects of the picture, mainly contained in Part V, "Policies for the Industry", looked badly out of date some years after it was written; yet most of it is now once again remarkably topical: *chassez le naturel, il revient au galop.*

My expectation that "patterns for oil peace" would be drawn up by governments because oil was too serious an affair to be left to oilmen (p.113) was not realised at the time. The International Petroleum Commission to be set up in accordance with the 1945 version of the

[3] For an economic and historical appraisal see:

P. H. Frankel and W. L. Newton — Current Economic Trends in Location and Size of Refineries in Europe. World Petroleum Congress, Fifth, New York, 1959.

P. H. Frankel and W. L. Newton — Recent Developments in the Economics of Petroleum Refining. World Petroleum Congress, Sixth, Frankfurt, 1963.

P. H. Frankel and W. L. Newton — Economics of Petroleum Refining – Present State and Future Prospects. Journal of the Institute of Petroleum, February 1968.

Anglo-American "Agreement on Petroleum" (pp.120/121) never saw the light of day because the Agreement was smothered by Congress, the "independent" sector of the U.S.A. oil industry being afraid of "the spectre of Federal control" (p.121). It was concerned about the danger of an international agreement having eventual repercussions upon the domestic scene, and little did its spokesmen know that some ten years later it would be they who would clamour for Federal protection in the shape of oil import controls.

Since nature abhors a vacuum, and since government agencies withdrew from the oil scene when the immediate postwar enthusiasm for international organisations began to wane, [4] the big oil companies which then were the only organisations which covered effectively the flow of oil across the borders of countries were left to do what needed to be done, a function which was in keeping with the "dual role" which (p.132) they had been seen to fill. It may well be that, had the United Nations developed into an effective kind of authority, it could have tackled the task of setting up a viable international oil structure, but this was not to be.

Although even the biggest oil companies had in 1945 felt that their efforts needed to be underpinned by governmental programmes, they saw, soon enough, that they had been unnecessarily timid and that they could manage very well on their own. The desire of the American and the British Governments to avoid an "oil war" was fulfilled in 1947 by a number of transactions in which the companies who had more low-cost crude oil than they could market themselves – Anglo-Iranian Oil Company Ltd. (now British Petroleum Company Ltd.) and Gulf Oil Corporation, Texas Company (now Texaco Inc.) and Standard Oil Co. of California - made some of it over in one form or another to those who had the "downstream" facilities but were short of crude: Standard Oil Company (New Jersey), Socony-Vacuum Oil Co. Inc. (now Mobil Oil Corporation) and Royal-Dutch/Shell. Some of these transactions were between U.S. corporations but most of the others spanned the Atlantic, as it were.

Had the companies with surplus crude had to fight their way into the markets and had those who were short of crude had to develop rapidly some sources of supply of their own, the world market would have taken on an entirely different character. As it was, the new equilibrium led to what I have called the Ten Golden Years in the course of which profit margins and return on capital were exceedingly high.

[4] The International Trade Organisation (ITO), which was provided for in the Havana Charter never came off and only GATT materialised, the General Agreement on Tariffs and Trade, which reduced impediments to international trade, but had no organisational life of its own.

The substantial price reductions of oil in international trade in the last ten years, at a time when the prices of most other commodities have risen, were due to some extent to the inherent competition among the large international companies which were bent on increasing or, as the case may be, on maintaining their respective market shares.

Yet, the moves which eventually started to upset this privately organised equilibrium originated in governmental quarters: France had had a *dirigiste* tradition since the days between the wars: once again and with increased vigour it fostered state-backed French enterprises, whereas Italy - especially in the days of the remarkable Signor Mattei - set up a string of state-owned companies as a means of matching the strength of (foreign) international oil companies. India, Pakistan, Ceylon and later Japan, took steps to influence investment and pricing policies of the oil companies; in all cases it emerged, as had been witnessed earlier on in the U.S.A., that the concomitant of Big Business was Big Government: since the international oil companies were such large units there could be no countervailing power on the business level in any one country; only its government was a unit of equivalent size and weight.

The scene shifts to the U.S.A.: the enormous difference in cost between most of the indigenous crudes and those from the Middle East and (to a lesser degree) from Venezuela, would, if price alone had determined the flow of oil, have resulted in foreign oil replacing much of the indigenous crude. The onrush of Cheap Foreign Oil was, however, held by that kind of "invisible hedge" (p.117) which had started to grow even before World War II. The fact that most of the low-cost foreign oil was controlled by a few companies who had a vital stake in the U.S. domestic market made it possible for them to apply in the first instance self-interested self restraint or one could at least for a while rely on what an American once called the "collective common sense of the several competitors". Such so-called Industrial Statesmanship began to wear thin in the late '50s and the U.S. authorities were eventually driven to imposing mandatory import controls without which the internal system of market-demand proration (p.133), applied in the main oil-producing States, could not have been maintained any longer.

Thus the U.S. had become a market which was subject to a high degree of governmental control, whereas American entrepreneurs abroad kept on demanding freedom for action then and there. Such freedom became anyhow qualified by forces coming from other quarters making themselves felt: when increased competition eventually drove Middle East prices down from their erstwhile high level – high in comparison with its cost of production – the producer-country governments, understandably concerned about the threat of their tax 'take', joined forces and, in 1960, formed an Organisation of Petroleum

Exporting Countries (OPEC) which made it possible to institute "collective bargaining" which in some respects proved much more effective than could have been any technique of individual negotiations.

Most oil producing countries – following the lead of Iran – have by now also established national oil companies of their own, which, apart from handling all or most of the domestic refining and marketing business, have in some cases entered the spheres of exploration, of production, of refining and of export. It is yet too early to gauge accurately what (if any) fundamental impact the emergence of these national companies will have on the fabric of international oil trade, which is still mainly managed by a limited number of substantial companies with a worldwide scope.

The consumers, or rather the oil importing countries, do not always fully appreciate that the oil companies together with the producer countries may present them with the prospect of high-cost energy; indeed, for some time in the past those importing countries, which had a high-cost indigenous source of energy to protect - coal in Europe and oil in the U.S.A. - appear to have fancied a situation which did not shake their own vested interest too much and too soon.

Looking at the situation as a whole one sees a form of symbiosis of the two systems, of corporate enterprise and of governmental planning; or should one perhaps, with equal justification, talk of corporate planning and governmental enterprise? No longer does it make sense to consider the "private" or "free" enterprise to be subject to "interference" by governmental authorities; one could say with as much (or as little) justification that corporate activities "interfere" with national policies. The truth is that neither system is self-contained and that they depend on each other for their respective developments. Whereas this is obviously a generally applicable concept it has some specific relevance in and for the oil industry.

The international companies, who look for oil where they find it and refine and sell it where they may, play an indispensable role by virtue of their diversification. It gives them and through them the world stability by way of the insurance element mentioned earlier on and flexibility to adapt themselves effectively not only to peaceful change but also to the shock of war-borne crises. They do in fact attempt and to some extent achieve a worldwide optimization of effort and investment.

Yet they cannot have it all their own way, because of the incidence of local, national and regional circumstances and interests. If the whole world were one unit, if there were no local and especially national tenets which render unacceptable a degree of division of labour under which the low-cost sources would be preferred altogether to high-cost

ones, wherever they are, optimization on a truly world scale would not only be desirable, it would be possible. But the world is not one unit, local industries on which the livelihood of large sectors of the population may depend[5] cannot simply and rapidly be optimized out of existence and, still more relevant, national security in the political as well as in the economic sense of the word cannot always be subordinated to the possibly short-term convenience of low-cost imports. In fact there is something like a local, national or regional optimization which is determined by a number of elements germane to their particular situation.

What really matters is to find a viable and judicious blend of the two optimizations: if the world-orientated system is apt to destroy indispensable elements it has to be curbed, but if the locally or nationally motivated concept leads to a degree of cost increase which becomes self-defeating, it has to be moderated. Thus there *is* a target such as an overall optimization: at worst it might be a tenuous compromise, but at best it can be a mutual adaptation resulting in a pragmatic sort of harmony. Almost a quarter of a century after "Essentials" was concluded, one should find as inevitable and as desirable as ever the idea of the coexistence of governmental and corporate policies.

[5] It was to be foreseen at the end of the war that the overriding need for those governments which depended on an electorate to maintain reasonably full employment (see pp.135/136) would lead to a high degree of governmental involvement in industrial developments.

APPENDIX: TRANSPORT PROBLEMS

Most of the trends originally outlined have prevailed: transport items continue to be a very substantial part of the ultimate cost makeup at the point of consumption. This is partly the result of the prominence of the Middle East as a supply base to the world, which, due to its being comparatively remote from the main centres of consumption, pushed up the average ton/mile element. On the other hand, economies of scale, and the technological progress which they engendered, have greatly reduced the cost per ton/mile.

In 1945 it was just possible to perceive that the pipeline - the Perfect Carrier of p.39 - would score, not only in the U.S.A. but also almost everywhere in the world, including Western Europe and the Soviet Bloc. On pp.142/143 it was said that the 'oil grid', consisting of pipelines, which was envisaged might "give the Government the opportunity of making its intentions felt". The governments have not wished (or not dared) to take the initiative, and the long-distance pipelines which now crisscross the Continent of Europe have been built by the oil industry, with the Big Three in Europe - Esso, Shell and BP - in a commanding position.

Whereas the unit of operation in respect of river, rail and road transport was small, thus facilitating entry of "newcomers", the unit of pipelines is very large, due to economies of size and the need for continuous use at near-full capacity of a capital intensive facility. In the absence of a governmental transport policy only the biggest users could fill the void and they have now obtained a degree of overall control which was never within their grasp heretofore.

The emergence of crude oil pipelines, and the dramatic reduction of overland transport cost which this brought about, made possible the construction of large refineries in land-locked positions which has changed the balance of the map of world refineries.

The Appendix II – p.157 *et seq.* – is to some extent out of date: the tanker is no longer in as much of a "splendid isolation" as it once was. There is a significant movement of tankers into and out of the grain trade, which to a certain extent moderates the extreme positions of surplus and shortage; also there are now a significant number of Bulk Carriers, also called Combined Carriers, in service which can, alternatively and also partially, carry iron ore, etc. *and* crude oil. These bulk carriers also can at times provide a "backhaul", thus reducing the economic burden of a ballast voyage.

The main cases of violent fluctuations of tanker rates were, in the postwar period, bound up with political turmoil (Korean War and the two "Suez" crises). In more normal times the incidence of short-term ("voyage charter" or "spot") rates. which were all one could go by before the war, is now much less marked. A more sophisticated approach has resulted in our understanding that spot rates are most of the time "marginal" in the sense of not being representative of the great bulk of oil transport which moves in company-owned tankers and in tankers on long-term charter. The idea outlined on pp. 160/161, that the actual oil market is to a greater extent determined by spot charter rates than the statistical evidence would make us believe, is now less relevant than it was when most oil was transported as finished products; the re-location of refineries towards the centres of consumption has resulted in most of the oil being moved overseas as crude oil. Those "independent" operators who count are not now, as they were then confined to spot chartering; they too can now take a longer-term view.[6]

[6] An analysis of these problems incorporating a review of the more recent endeavours to provide a meaningful interpretation of the fluctuation of tanker rates (including the Average Freight Rate Assessment, known as AFRA) is to be found in the paper by W. L. Newton - The Long Term Development of the Tanker Freight Market. The Journal of the Institute of Petroleum, September 1964.

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