Conservation, Integration, and Pricing in the Oil Industry of the United States: A Review
Article
Author(s): John S. McGee
Published by: Wiley
Stable URL: http://www.jstor.org/stable/2097467
Accessed: 16-10-2015 09:46 UTC

REFERENCES
Linked references are available on JSTOR for this article:

You may need to log in to JSTOR to access the linked references.

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at http://www.jstor.org/page/info/about/policies/terms.jsp
JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

Wiley is collaborating with JSTOR to digitize, preserve and extend access to The Journal of Industrial Economics.

http://www.jstor.org
CONSERVATION, INTEGRATION, AND PRICING IN THE OIL INDUSTRY OF THE UNITED STATES: A REVIEW ARTICLE

by John S. McGee

I. INTRODUCTION

It is at least superficially appropriate that the last volume of an imposing trilogy on oil should have been issued in 1959, a year adopted by convention as the centennial of the oil industry in the United States. The date of conception is often as interesting as that of fruition. The trilogy is the product of a research project initiated by an oil industry association one year after the appearance of Eugene V. Rostow's book on oil.1 Rostow's essay was both a highly critical evaluation of the industry's performance and a positive and painful prescription for its reform. The project was financed by the American Petroleum Institute, and provided for another investigation of topics upon which Rostow concentrated: conservation, integration and pricing. Four academic economists were engaged to explore these fundamental issues, and, as prefatory notes emphasize, their work was explicitly and carefully insulated from untoward pressures by interested parties.

Cassady's volume appeared in 1954;2 Zimmermann’s in 1957;3 and the de Chazeau and Kahn volume4 in late 1959. I shall here consider them out of order of their appearance, taking first conservation, next pricing and, finally, integration. For convenience I shall, in each case, first outline what the author seems to say, then turn to a critical evaluation of his thesis.

II. CONSERVATION

Zimmermann first outlines a strategy of resource use based on maximum physical recovery and the protection of individual property rights. He then shows how the concept of conservation in the United States has evolved. In parts of Chapter 3, Zimmermann is at his best. He argues that oil is unique because reservoir energies can be dissipated by improper, including too rapid, exploitation; and

because it moves without reverence for surface property rights. By contrasting the actual production history of selected fields under uncontrolled and controlled conditions, he shows that under *laissez faire* the fields produce relatively much more oil in the early years, then decline more rapidly; and that the total physical recovery will be less than under conservation rules of the sort found in Texas and Oklahoma. The production rate from a reservoir and the allocation of the output amongst wells in the field will significantly influence ultimate recovery. Zimmermann defines the now-famous concept of the Maximum Efficient Rate (MER) of production as ‘... the highest rate of producing oil and gas that does not cause physical waste or reduce ultimate recovery’, and contrasts it with ‘... the most efficient rate, which may conceivably be a rate below the MER’ (p. 69).

These obdurate physical forces interact with man-made factors. First, in the United States antique legal principles generally give the owner of surface lands rights in those minerals that lie beneath them. In a settled country in which there are many relatively small land-owners, it is improbably fortuitous when individual surface land-holdings coincide with petroleum reservoirs. The rule that a land-owner owns the oil underlying his property was most troublesome in practice. How much oil underlies a given land parcel is highly uncertain. That oil can often be made to migrate from beneath one owner’s land to another’s is undeniable. A workable rule would have to be applicable without endless and paralyzing litigation. By reaching back into the law with respect to percolating waters and wandering wild beasts, the law found one way out. It emerged with what has come to be known as the Rule of Capture, which roughly provides that whoever reduces the oil to possession owns it, regardless of whether it has migrated from beneath a neighbor’s land. Such a rule is easily applied, which is a merit in the law, but it has some unhappy consequences. To achieve favorable drainage, and prevent unfavorable migration, any landowner may benefit by vigorous drilling to the limits of his property line, and by rapid withdrawal. What each finds it desirable to do may be done by all in a frenzy of offset drilling. As a consequence, a reservoir may be over-drilled and exploited too rapidly, both from the private and social points of view.

Second, not only have nature and the law conspired to create troubles, but, according to Zimmermann, the market contributes some of its own. Because both the supply and demand for petroleum are inelastic, ‘... the free working of automatic market forces does not assure prompt and smooth adjustments between supply and
demand in response to reasonable market price changes, rendering socially desirable, if not necessary, market adjustment through state regulation (p. 91). One source of difficulty are the ‘stripper’ or marginal wells, a very numerous class in the United States. Zimmermann fears that they will be abandoned prematurely because of uncontrolled price fluctuation. This is especially unfortunate, since dynamic changes in such shut-in reservoirs may make it infeasible ever to resume production from them (p. 75). The loss is irretrievable; the cause is the capricious operation of inelastic demand and supply in an uncontrolled market.

These physical, legal and market forces combine to produce chaos, unless something can be done to civilize them. In Chapter 5 Zimmermann briefly but interestingly outlines what the nine leading oil states, contributing about 90 per cent of the crude oil production of the United States, have done. Chapter 6 deals with Federal land policy, administration of naval reserves, market demand estimates, antitrust, import and tax policies. The famous Interstate Oil Compact Commission (Chapter 7), under the aegis of the Federal Government, ‘... subtly influences, promotes harmony among heterogeneous elements, and creates a favorable environment for understanding and collaboration ... ’ amongst the roughly thirty oil-producing states that are represented on it (p. 209). With her 40-50 per cent of national production and reserves, so great is the contribution of Texas to stability that Zimmermann acclaims her the ‘National Balance Wheel’. The mechanism which turns the wheel is the Texas Railroad Commission, whose principal interest in the regulation of that state’s oil production belies its name. To make a long and complicated story short, we may say that the Texas Commission follows two basic principles. First, in no case may the production of crude oil from a reservoir exceed the Maximum Efficient Rate, to avoid ‘physical’ (or engineering) waste. Second, the Commission determines the total ‘Reasonable Market Demand’ for Texas oil, and holds production to that level to avoid ‘economic waste’. Thus, 1948 was the last year that Texas produced roughly at her aggregate MER; as ‘market demand’ declined more and more of the State’s capacity was shut in. Idle capacity has thus been massive and increasing.

In a final ‘evaluation’, Zimmermann concludes, partly on the

---

5 It may seem strange that regulation of the production of oil, an important part of which is obviously in interstate commerce, should be carried on by the separate states rather than by the Federal government. Under the United States Constitution, the states reserve broad but vague powers to regulate public health, safety, morals and welfare. This should not be taken to mean that the Federal Government could not assume the power to regulate oil production by Congressional legislation.
basis of informed industry opinion, that aggregate crude oil recovery has been increased substantially, perhaps by 50 per cent or more, because of state conservation policies. Furthermore, as he puts it

One must keep in mind that in the case of petroleum the state regulation of the production of oil does not serve restrictive ends but is necessary to render effective competition in an industry that, because of unique characteristics, in the absence of such regulation, would succumb to intolerable anarchy (p. 269).

In sum,

The conclusion here reached is that on balance the conservation program yields net values to society in terms of greater availability of petroleum at lower costs and of greater stability of one of the leading industries of this nation. That all this may also contribute to the financial success of the petroleum industry is not denied (p. 325).

Chapter 10 examines 'weaknesses' of the conservation program: the difficulties of determining MER scientifically; the equity problems inherent in allocations of allowable production amongst thousands of fields and hundreds of thousands of wells; the lack of rational well-spacing to prevent wasteful over-drilling; insufficient unit development of petroleum reservoirs; and the problem of imports. Chapter 11 deals with the outlook for energy availability, concluding not too helpfully that the future is uncertain and that we should exploit our disappearing fossil fuels as efficiently as possible.

A fair synopsis of Zimmermann's summary and conclusions can be found in his own words:

While this monograph thus concludes with an unequivocal endorsement of the petroleum conservation program as a socially desirable method of aiding this unique industry in the quest for reasonable order, it must be clearly understood that this endorsement, while unequivocal in its general conclusion, is by no means complete and definitive. Although much improved over earlier versions, the system of control now extant is still far from perfect (p. 394).

In my opinion, Zimmermann's book is disappointing and potentially misleading. There has been a crying need for a study that unifies technology, law and economics to give us a clear and accurate account of petroleum conservation.\(^6\) As a brief and simplified exposition of the mechanics of petroleum conservation in the United

\(^6\) George W. Stocking's classic, The Oil Industry and the Competitive System, A Study in Waste, Boston, Houghton, Mifflin, 1925, admirably covers the preconservation period.
States, this volume is interesting and will be of value to those unfamiliar with the field. Even so, a much more detailed and searching review of the mechanical operation of the various programs would have been most welcome and useful. That job still wants doing.

Zimmermann’s economics, inferences and judgments disturb me most. Conservation is defined as maximizing the ‘ultimate recovery from the reservoir’ (p. 9. See also p. 27). But a sane society cannot be indifferent to how much it costs to recover fossil fuels, and when they can be recovered. To say that one technique is better just because it recovers more is obviously not enough. Social goals, if they are not to be expensive and dangerous dreams, must explicitly consider costs; and recognize, as has Mr. Khrushchev, that future benefits are subject to discount factors. On page 310, it is true, Zimmermann takes a small step toward an economically meaningful definition of ‘waste’, but it is too little and too late to salvage policy arguments made in the interim.

This is no occasion for a full-dress review of the economics of conservation. Conservation is a not very special case of economizing scarce resources; it is achieved by maximizing the present social value of resources (net of costs). Whenever private and social costs diverge, it is an appropriate goal of policy to bring them together. Zimmermann has misconceived the nature of this divergence. He repeats and approves the commonplace assertion that society takes the appropriately long view whereas individuals cannot: ‘... the social group is responsible for its own security, and that responsibility causes it to discount future values far less than, for example, an individual sixty-year-old who has no descendants’ (p. 42). Longevity has nothing to do with it if, as is actually the case, there are markets in which the sixty-year-old can sell his claims on future production. The problem then becomes whether a market is likely to value them inappropriately.

George Stigler has pointed out the real difficulty with oil in the United States. It arises because the ownership unit and the appropriate technological unit often do not coincide.7 A simple hypothetical example may serve to show the nature of the problem. Assume that there is absolutely no regulation of oil production; that there are many independent producers in each field; and that the technological unit (the reservoir) and ownership or control unit (the lease) do not coincide. Beyond some point, because of dissipating reservoir energies, costs will rise with the rate of withdrawal and aggregate physical recovery will decline. Assume that scarcity rents are being earned on especially rich oil properties, entry is free and

exploration is vigorous. These assumptions closely approximate the situation prevailing in the oil industry of the United States before conservation programs became important.

Suppose now that a new field is discovered. Because of ignorance, uncertainty, excessive costs of organizing large numbers of independent oil operators, or other reasons, the new reservoir is not developed as a unit. It is every man for himself. If there are many operators each will develop his drilling pattern and production rate independently and probably without regard for any influence on aggregate efficiency. What are the consequences of all this? First, costs for the reservoir will be higher than if it had been developed as a unit. Second, a competitive equilibrium will be established such that costs equal revenues at the margin, with scarcity rents remaining. This equilibrium will, of course, have been established through a process of a growing number of participants in the field, a growing number of wells, a rising cost structure, and — if the reservoir is a large one — by measurable effects on price. Third, if the reservoir is a large one, crude oil prices will tend to fall as the field is exploited, reach their nadir with the field’s peak, then more slowly rise as field output goes into a protracted decline.

Although Zimmermann does not sketch the problem even in this much detail, this is clearly the situation with which he compares our present conservation programs. He does not seriously consider any other alternative.

This is arbitrary procedure. It dismisses an approximately ideal policy: the development of each reservoir as a unit. Under unit development and operation, there is one managerial unit in charge. There is no adverse drainage. Monopoly power is not likely to be created: even the largest domestic field is a relatively small part of the total crude market. A prudent unit operator will seek to minimize costs, and there will be no systematic overdrilling. Nor will there be uneconomically rapid withdrawal. If compulsion is necessary for unitization, it is appropriate for the state to exert its powers. If private and social costs still diverge, though I see no clear reason why they should, state taxes, subsidies, or other measures can be employed. It can be argued that unit development imposes an unrealistically great burden on knowledge and prudence. That burden is no less under meticulous state regulation of production on a well-by-well basis. There are about 200,000 wells in the state of Texas alone.

Zimmermann should have compared the present conservation system with the best alternative, and not only with totally unregulated production in which the technological and ownership units do
not even approximately coincide. Nevertheless, even using the latter comparison, I think that Zimmermann goes too far. Because maximum physical recovery is a false god, it is not clear just how much worse off we would be without any regulations. Taking into account discount factors, how much—if at all—are net social values increased by the present programs? To say that recovery is increased by 50 per cent or more is only to begin the argument, not to end it. For crude oil controls in the United States include monopoly elements. Restrictive import policies enhance them. Unlike Zimmermann, who can find no reason why the industry should want to restrict output and raise prices (see pp. 278, 308 for two remarkable statements), I find sufficient reason in economic theory and practice. The most favorable assumption for the present system is that costs are minimized. In theory, it is not hard to show that a monopoly which produces at zero costs may charge higher prices, and distort resource allocation more, than competitors struggling under a substantial cost burden. Therefore, even unregulated anarchy in oil may be more beneficial to the public than state-created monopoly. It all depends upon how great the cost savings are under monopoly, and how much power the monopoly has. I see no a priori way to decide which outcome will be better in practice, and Zimmermann provides no relevant criterion. He apparently does not recognize that there is such a problem.

This is not the place exhaustively to test the hypothesis that crude oil conservation operates like a state-supported cartel. Nevertheless, that hypothesis seems to be more consistent with observed behavior than Zimmermann’s alternative explanation. One example is the continued exploration, drilling and growth of crude oil reserves that Zimmermann finds difficult to explain with a hypothesis of monopoly. When any cartel fixes a price above the competitive level entry will occur unless effective barriers can be erected. If demand does not increase faster than entry, idle capacity will grow. Entry will go forward until one of various possibilities materializes. The cartel may lose its grip: outsiders may bulk so large that the cartel is impotent to do more than establish a competitive price, and the end is at hand. The industry will now be too large by competitive standards, and a painful period of adjustment will have to be undergone, unless growth in demand comes to the rescue. If, instead, state or other regulations preserve the cartel price, entry will continue until costs are bid up, permitting only a normal return to anyone entering; or each firm will have such a reduced share of the trade as to yield only a normal return because of the high cost of part-time operation. Some rationalization should then be expected to occur.
In neither case can we say that society has been well served, even though capacity has grown enormously. For upwards of ten years excess crude producing capacity has grown in the United States. It is now very great. Crude oil prices have behaved in a way that defies a competitive explanation. Even the present loud complaints by the domestic industry, many of them genuine, would be normal for this stage of the cartel life cycle. If oil imports had not been controlled, I think that we would have seen the beginning of the end of monopoly power in domestic crude production.

Oil conservation in the United States may be even worse than a simple cartel hypothesis suggests. Private cartels will at least try to minimize costs by producing in the lowest cost facilities. The least efficient may be shut down entirely. But in Texas, for example, marginal properties are favored and probably produce more than under either competition or a private cartel. Thus ‘conservation’ policy sharply curtails output from rich flowing wells while stripper wells go full tilt, as might be expected of elected officials governing an industry that includes many small producers. The Suez crisis furnishes a pointed example. The Texas Railroad Commission refused to increase allowable production selectively, rather than ‘across the board’. Crude was wanted at the Gulf, and could have been produced there at lowest cost, but the Commission refused a ‘discriminatory’ allowable increase there. Whether because of political implications or the difficulty of transfer payments from those privileged by location to those producers who would have to acquiesce, I do not know.

There remains, as mentioned previously, the time-worn argument for controlled price stability in oil: marginal or stripper wells will be shut down prematurely by short-term price declines, and the reserves they tap may be lost for ever. There is considerable doubt that the problem is serious even on a physical or engineering level. It has never been systematically demonstrated. True, every experienced oil man can dredge up a few cases in which long-time shut downs cost some reserves, because of corrosion or lost circulation. Most will privately admit, however, that the occurrence is atypical and the aggregate loss small. Some even claim with assurance that the same applies to water floods. The shorter the period of shut-down, the less the danger of loss.

Judged by (the more relevant) economic criteria, the problem is still less important, if it exists at all. The operator of a marginal oil property will abandon it only when its present operating worth (taking alternatives into account) falls to zero or below. Before doing so, he will take into account as best he can the future costs and
benefits of any reserves that will be lost. If knowledge were perfect, he would not abandon because of temporarily low prices, but only when the reserves are simply not worth keeping, and society should not grieve. If there is systematic error or irrationality, of course, some reserves would be abandoned when they should not be, and some would be kept when they should be abandoned. But there is a market for oil properties, and differences of opinion are responsible for other things than horse races. In any event, it is difficult to legislate against error, if for no other reason than that legislators and regulators themselves may be subject to it.

If the problem is that some operators in a reservoir will shut down while others will not, that problem should be attacked directly, not through an elaborate system of price maintenance.

In sum, the Zimmermann volume will be a useful source of information for anyone interested in the oil industry. But he should be careful to distinguish data from judgment.

III. PRICING

The structure of demand for petroleum products in the United States differs considerably from that of the rest of the world. Cassady's study begins with a brief discussion of the types and relative importance of petroleum products offered in the United States, and a description of the marketing channels through which they flow. Inquiring into the nature of competition he finds that concentration differs markedly amongst the crude production, refining and marketing sectors. One of the most interesting aspects is the proportion of gasoline sales enjoyed by each important firm in the West Coast and Midwest markets in 1949.

Several cost and demand factors that contribute to price and product competition in the industry are illustrated by short case studies of unnamed, but recognizable, firms. Cassady concludes, not too surprisingly, that policies differ amongst firms; and that all, large and small, must be alert to stay alive in this 'dynamic' industry. Although he is unable to explain it, Cassady also finds that the share of market enjoyed by the 'minor' or 'non-major' firms varies greatly amongst markets.

Chapter 5 is an elementary treatment of the role of price from the viewpoint of society and of the firm; gasoline demand elasticity; and opportunistic pricing. Cassady concludes that there is leadership in posted, if not actual, prices in many crude and product markets. The leadership is essentially 'barometric', and no undue monopoly power can be inferred from it.
As for crude oil pricing, Cassady treats quality and location price differentials for crude oil, and barely discusses production controls. Conservation, he concludes (pp. 113-14), has both stabilized and raised the price of crude oil in the United States. This is, of course, a quite different conclusion from that reached by Zimmermann. He presents some data showing deviations from posted (i.e. nominal) prices during periods of surplus and shortage, together with the volume of crude oil sold at these unofficial prices.

Cassady then presents various anecdotes illustrating forces making for changes in the posted price of crude oil. Inter-company trades of crude oil are considered barter of a benign sort. He shows that crude oil prices are much more stable than the prices of refined products. Hence, the refinery margin has fluctuated substantially around a steep and rather steady decline throughout the nineteen-twenties, and a lower plateau through the nineteen-forties.

The discussion of pricing at the refinery level begins with a useful section on sources of price data. There follow several chapters on pricing to large commercial users, government agencies and other refining companies; to jobbers and retail filling stations. Some attention is paid to the geographic structure of gasoline prices and, in truncated case histories, to changes in the tank-wagon price.

The treatment of pricing at the retail level includes collusive activities among retail dealers and government restrictions on competition; variations in price dispersion amongst cities; and retail ‘price wars’. Trends in crude oil and products prices, over time and amongst places, are then considered.

Cassady’s ‘social appraisal’ of pricing in oil compares indexes of petroleum products prices with commodity price indexes over time; the price of gasoline and coffee, apples, prime ribs, dog food, bottled water and cold breakfast cereal, etc., at a point in time; and the prices of coal and petroleum fuels at selected localities. The relevance of these comparisons is not clear. Profitability varies over time and amongst companies, but is not obviously too high. All of this suggests to Cassady that the industry is competitive.

Finally, Cassady attempts to test the structure and performance of the industry by applying criteria of ‘workable’ or ‘effective’ competition. In doing so, he waives the examination for crude oil production, saying only that ‘... the competitive structure in crude might not pass muster because freedom of production is curtailed by law’ (p. 336, n. 6). In only three states did the leading marketer sell as much as 35 per cent of the gasoline in 1950, and in most states the largest seller accounted for 25 per cent or less. Nor does he find artificial impediments to entry at any level. He finds little evidence
of collusion, and concludes that the industry is effectively competitive.

Cassady’s book is more anecdotal than analytical. The color and flavor of the industry are there, but the economic analysis is very elementary, sometimes primitive. The tests of industry performance are hopelessly naive. Nevertheless, I suspect that he is essentially correct in his judgment. Those unfamiliar with the mechanics of gasoline marketing in the United States will find this study helpful and interesting.

Perhaps Cassady anticipated that Zimmermann would do a detailed study of crude oil pricing. In fact, neither did it. As a consequence the most interesting and important price in the industry did not really get analyzed.

IV. INTEGRATION

A firm is vertically integrated when it ‘transmits from one of its departments to another a good or service which could, without major adaptation, be sold in the market.’ Messrs. de Chazeau and Kahn undertake to describe and evaluate integration in the American petroleum industry.

Part I analyzes the structure of the industry. The oil industry is huge and complicated and companies tend to run large. Nevertheless, concentration is less than the average for manufacturing industries in the United States. In 1954 the four largest refining companies accounted for about one-third of total oil product shipments, and the twenty largest for some 84 per cent. The authors conclude that the industry is ‘dominated by a relatively small number of companies’ (p. 17), concentration being highest in transportation, less (‘though still high’) in refining, and still less in crude oil production and in marketing.

With the exception of Amerada (crude oil) and Standard Oil of Kentucky (marketing), the largest twenty firms (the ‘Majors’) are at least partly integrated from crude production through marketing. It is not vertical integration as such, but rather its combination with large ‘horizontal’ size that causes criticism. The fear is that integration may somehow ‘magnify’ relative size and create monopoly power.

Some economists think that vertical integration does not enhance or preserve monopoly power. Two of these are Bork and Spengler. About the Bork-Spengler school of thought, the authors tentatively conclude that

---

there is basic truth in the assertion that it is *horizontal* monopoly that is the major threat to a freely competitive economy... [but it] minimizes unrealistically the threat that vertical integration, when combined with seriously imperfect competition in some segments of an industry, may itself pose for horizontal competition (p. 46).

De Chazeau and Kahn fear and suspect vertical integration for various reasons. It may forestall socially beneficial countervailing power by independent buyers or sellers on the other side of markets in which monopolists operate; may increase capital requirements for entry; may make possible 'squeezes' of non-integrated competitors by integrated firms 'whose losses or gains at one level of production are offset or modified by gains or losses at another' (p. 49).

After reviewing cost and demand conditions in oil — much as did both Zimmermann and Cassady — the authors proceed to history. In it they think they find evidences that vertical integration had anti-competitive motivations and consequences. In their view, the key to the ascendancy of the old Standard Oil refining monopoly was control of transportation, i.e. vertical integration. But integration also lowered costs, and there were still other reasons for it. Furthermore, if vertical integration sired monopoly, it also contributed to its collapse: newcomers and old rivals successfully integrated to escape the wrathful power of Standard Oil.

After Standard Oil was dissolved in 1911, the independent successor companies began to lose share in all the markets in which they had been pre- eminent. There were also mergers. By about nineteen-thirty, the organization of the industry had stabilized. In the authors' words,

... over-all the organization of the oil industry does not look much different today than it did, say, thirty years ago; and the integration of the major companies has contributed directly to this stability (p. 99).

After some twenty-nine pages of history, the authors candidly conclude that

... this analysis of the historical record is less an explanation than a description of integration. All it really says is that companies have sought managerial control over their raw material supplies and product distribution because they wanted

---

10 The selection of Ida Tarbell as a reliable source of oil industry history is about as questionable as defining economic from *Webster’s Dictionary*. Cassady relied upon Webster's for definitions of 'competition', 'dynamic' and 'policies', for example. See Cassady, pp. 29 n., 42 n., and 47 n.
the greater assurances that financial control brings. Attempts to supply narrower and more precise interpretations invariably lack conviction (p. 104).

The authors thus give us many reasons why firms may integrate: to make monopoly; break monopoly; avoid monopoly; increase profits by lowering costs, improving the product, regularizing operations; and to achieve greater security.

In part II the focus shifts to state regulated crude markets, for ‘... the production, control and pricing of crude oil become the crux of the perplexing issues posed by vertical integration in petroleum’ (p. 122). They review state production controls and crude oil price movements (including an interesting analysis of major production changes during recent recessions and the Suez crisis), concluding that ‘conservation’ policies in the United States have raised and rigidified crude oil prices. Crude oil prices have been further ‘insulated’ by the Majors’ control of pipelines, the mechanism of price-posting, and inter-company trades of crude oil. Interesting case studies of price changes follow. Though the sources of power are different, foreign crude oil is not produced and marketed under very competitive conditions, either.

Cassady reasoned that integrated oil companies producing less crude oil than they use should favor low crude prices rather than high. De Chazeau and Kahn dissent. Pointing to the favorable tax treatment of crude oil, and the long-run constancy of refinery margins, they conclude that even large purchasers on balance will favor policies increasing crude oil prices. Thus vertical integration gets into the crude oil problem, or vice versa. I shall comment on this conclusion later.

In contrast to Zimmermann, the authors seek economic rather than engineering goals in conservation. Characterizing present programs as ‘... a patchwork of interferences’, they plead for a coordinated national policy. They consider crude oil markets artificial and monopolistic; and buyer pressure on crude oil prices unreliable because of vertical integration. They urge compulsory unitization, abolition of quota restrictions on imports, and a searching review of the national defense arguments used to support favorable policies for the domestic oil industry. Not only do they believe that present policy is unduly restrictive, but they think it is poor conservation as well. As they put it,

It is clear that state controls under prorationing have failed to achieve attainable standards of efficiency in the development of oil reservoirs and that they discourage socially desirable
elements of competition in the production and pricing of crude (p. 255).

Part III of the volume deals with investment and innovation. Noting that vertical integration is sometimes criticized for increasing capital requirements, the authors announce that

The existence of integrated refining companies, commanding preferential access to crude oil and blanketing market areas with their own service stations, undoubtedly discourages investments in refining by outsiders (p. 261).

Nevertheless, they conclude, integration encourages additional investments by insiders. The net effect is somewhat obscure.

Although they do not find very clear evidence that vertical integration has anything to do with invention or innovation they ‘... cannot avoid the conviction that vertical integration has contributed substantially to industrial growth and progress in the petroleum industry’ (p. 309).

Whatever integration has to do with entry and innovation, it does not seem to be a royal road to profitability. As the authors put it,

In all but eight of the twenty-four years compared the integrated firms performed less well than the other refiners and marketers; in every year but four they earned less—often substantially less—than the group of smaller [crude oil] producers and consequently did even more poorly than the large [crude oil] producers. While the major integrated companies approximated, and sometimes equalled, industry average net earnings, they did not succeed as a group in excelling this average performance throughout the entire period (p. 323).

They then proceed to show why we should not trust the data on which that finding rests.

Because some natural monopoly power still inheres in pipelines, they argue for continued regulation of rates and profits, but against divorcement. In spite of the earnings data, the authors find that ‘... vertical integration in petroleum gives to the integrated firm a socially created unearned increment of crude oil value that colors its competitive relations with all other companies having no such resources’ (p. 371).

Part IV deals with integration and competition. Forward integration offers a kind of security that may alter competition: ‘... the security of not having to offer a higher price for an additional barrel of oil, or a lower price to pick up additional sales of gasoline’ (p. 381). In addition integrated firms
have acquired a capacity to reduce sales prices that goes beyond that of the nonintegrated firm, which acquires its supplies not at cost but at market price. The baffling question is, what is the net outcome, on balance, of these potentially contradictory purposes—reduction in costs or entrenchment of market position? (p. 428).

In their view, vertical integration not only promotes brand differentiation, but itself operates to increase the price of crude oil. What are apparently important parts of this contention are carried in footnotes at pp. 441-2. Finally,

In some degree, the financial link between production and marketing heightens and protects the crude oil price and therefore adds to the periodic squeeze on refinery margins ... The consequence clearly is to make independent entry in refining less attractive than it otherwise would be ... (p. 445).

The average size of refineries and refining companies has grown substantially; the number of refining companies has declined sharply but is still great; the share of the total market going to the largest firms has remained stable since 1930, but the ‘newer majors’ and integrated independents have taken a larger share of the market. Nevertheless, there are many prosperous independents, whose success is in good part attributable to vertical integration in emulation of their larger brethren. According to the authors the smallest non-integrated refiners would benefit from an overhaul of the mechanism by which crude oil production is controlled.

As far as marketing is concerned, there is apparently little cause for worry. The number of retailers remains high, and there has been no trend of the majors to by-pass independent marketers through integration.

In conclusion, the authors claim that a measure of price stability has been achieved by the industry, through a combination of ‘dominant position of the large vertically integrated oil firm’, state crude oil controls and federal limitations on imports. Nevertheless, concentration has not increased, vertical integration per se does not prevent competition, and ‘the basic structure beyond the crude oil level remains essentially competitive’ (p. 554).

Concluding this lengthy and involved volume: ‘the most serious accusations against vertical integration are that it compromises where it does not pervert the interest of the industry’s most powerful firms in low crude prices ... ’ (p. 565). But, ‘certainly, vertical integration itself is not incompatible with workable competition’ (p. 567).
As may be inferred from the torturous review that I have been obliged to make, this book defies systematic summary. It is not only because the study is prolix, though it is unnecessarily long for what it has to say. Nor is the subject, or treatment, especially profound. One reason is the style: recursion substitutes here for exposition. The argument does not march; it lumbers. In that respect the other volumes are better.

But if de Chazeau and Kahn have a fitful sense of direction, their sense of smell is rather good. Something, at least, led them to a critical review of the conservation mechanism. It is anomalous that this volume contributes less to the subject of integration than to the issues presumably delegated to Cassady and Zimmermann. Whether this book was originally planned as an integration of the three-volume study, or as a study of integration, its organization and character are as if plans had been changed in mid-passage. It is as though the authors did not find much to say about integration, were not satisfied by the companion studies of conservation and pricing and turned their best efforts on those subjects. De Chazeau and Kahn are at their best on crude oil conservation and pricing, and are neither as clear nor convincing on integration.

In my opinion de Chazeau and Kahn tell us little about vertical integration that received theory has not already revealed more clearly: the motives for integration are diverse, as are its effects. A firm may integrate to reduce costs, or to avoid monopsony or monopoly on another level. Integration may permit a monopolist to practice monopsonistic discrimination that might be impracticable if some levels are left competitive. Similarly, it may permit price discrimination in selling that would not be feasible otherwise. If capital markets in fact impose higher costs or other restraints upon large investment projects than upon small, integration may inhibit entry by imposing larger capital requirements. De Chazeau and Kahn do not show in what ways capital markets would have to work to produce the result they fear. Even more dubious are general allegations that integration ‘colors’ the relationship of integrated firms with nonintegrated competitors. De Chazeau and Kahn do not explain the mechanism by which such effects take place, or even define what the effects are. A careful and compact review of theoretical propositions, and a careful testing of them, would have produced a clearer and shorter document. As it is, much of their argument seems to me essentially meaningless or non-operational.

Such testing could be done from the history, but the authors have not done a thorough job even with the history they have. For example, although a simple hypothesis leaps to the eye from the data...
on refinery margins and crude oil profitability, the authors do not adequately discuss it. Before its dissolution in 1911 the Standard Oil Company of New Jersey established an enormously successful monopoly in refining. It never approached self-sufficiency in crude, which apparently remained competitive. With dissolution and a rapidly growing market for refined products, competition was established in refining. After the mid-thirties, crude oil became especially profitable because of insulation from competition, and depletion tax allowances. Theory predicts that refinery margins and profitability will decline as competition is established; that crude oil profitability will increase as competition is reduced; and that refiners on those grounds alone will strive for greater ‘integration’, i.e. for a larger share of the richer proceeds stemming from crude oil. These simple hypotheses are consistent with the de Chazeau-Kahn data. Their explanation is more complex, and more ambiguous.

Another example of unconvincing analysis is the treatment of inter-company crude oil trades. The authors suspect that trades are more or less covert and may narrow the open market, somehow affecting entry or knowledge, or facilitating a monopolistic division of territories. Neither reason is convincing, or even plausible. Posted crude oil prices, at least, are known to everyone; ‘outsiders’ can and do learn whether there are other prices, since they can and do buy crude oil. It is not clear why (apart from incompetence) non-integrated refiners should be less aware of the possibilities of buying at shaded prices or why crude producers should be less aware of the need to shade their prices. Furthermore, a division of territories can as well or better be accomplished by sale and purchase as by barter. Firms may trade crude oil to reduce taxes. Whether this is the real reason I do not know. De Chazeau and Kahn do not consider it.

An important part of the de Chazeau and Kahn analysis is the attitude of integrated firms toward crude oil prices. To evaluate it, they use essentially the simple model developed by Serge Jurenev of Continental Oil. The model has four strategic variables: the tax rate applicable to crude; the tax rate in refining; the proportion of crude needs purchased; and the proportion of the crude oil price increase which can be passed along through higher product prices. The writers conclude that the ‘typical’ integrated oil firm will benefit from crude oil price increases. That conclusion may be correct, but their model is deficient, particularly in the assumption that total product sales will not be reduced at all by a rise in prices.

The issue is, of course, whether the present worth of an integrated oil firm is reduced or raised by an increase in crude oil prices.
stemming from, say, increased demand or lessened competition. The
demand for gasoline may be relatively inelastic with respect to price,
but only for small changes around present levels. The burning oils
have higher demand elasticities, reflecting the existence of closer
substitutes. Outside narrow limits engine tuning is to some extent a
substitute for gasoline, as are smaller engines and lighter automobiles.
These product elasticities are crucial: if they are zero, which no one
seriously suggests, sales are unaffected by price, and any company
producing one barrel or more of crude oil will benefit from an
increase in the price of crude. If elasticities were infinite, which no
one seriously suggests, none of a cost increase could be passed on and
crude price increases would tend to hurt any refiner who purchases
one barrel of crude oil or more. Thus, the higher the price elasticity
of demand for products, the less likely it becomes that a partially
integrated refiner can benefit from an increase in the price of crude oil.

Next is the matter of costs. If the marginal cost of the crude
producing industry rises steeply, a rise in crude oil demand will have
a more pronounced effect on crude oil prices. If it were perfectly
flat, and if competition prevailed in crude oil production, crude prices
would not rise. Similarly, the nature of costs in the individual
company's crude and refining departments are important. If
additional crude output can be gotten only with steeply rising costs,
potential benefits will be somewhat retarded. A problem of com-
parable importance is the output change permitted by state con-
servation authorities.

Then there is the important question of the derived demand for
crude oil, which is a function of costs in refining, transportation
and marketing; and of the final demand for products. It should also
be mentioned that, for some problems, the relevant elasticity will be
that of domestic crude oil. When there are imports (or important
states that are not subject to production controls) the elasticity
facing state conservation commissions will be larger than that for all
crude oil irrespective of source, even if the commissions conspire.
The most favorable circumstance arises when there is monopoly in
crude oil production. Yet even that is not a sufficient condition.

If there are monopoly elements in refining, which would gener-
ally imply that refiners are operating in the elastic range of the
demand curve, those who are not self-sufficient in crude oil will
tend to lose from an increase in its price. Monopolistic refiners will
'cost' their own crude oil production at its marginal cost, and will
buy outside only those quantities for which market price is lower
than the internal cost of production. Crude production controls do
not vitiate this rule.
Put in this way, the problem is complicated, but not imponderable. Good estimates of the necessary information can probably be made. The analysis would not then suffer from ad hoc qualitative judgments about significant factors not contained explicitly in more primitive models.

Although I have gone to some length to show that de Chazeau and Kahn have made an unsophisticated approach to a problem they regard as crucial, the problem is very likely not crucial at all. The real problem is that there may be substantial monopoly power in crude markets. If refining companies owned no crude properties, they might be more hostile to state production controls. But what could they do about it? It is difficult to argue that individual refining companies have significant monopsony power. Any suggestion that the remedy lies in creating monopsony power in vertically dis-integrated refining firms is unlikely either to please de Chazeau and Kahn or to solve as many problems as it creates.

In my opinion, the issue of vertical integration has nothing essential to do with the issue of monopoly in crude. In any event, the authors do not demonstrate why crude oil monopoly would be mitigated if there were no vertical integration. It is at least as plausible that a ban on vertical integration would increase rather than lessen the crude oil problem.

V. CONCLUSIONS

The conclusions of these three volumes are somewhat contradictory: crude oil conservation in its present form is superior to alternative forms of industrial control, and the result has been lower prices to the consumer (Zimmermann). Crude oil controls have stabilized and raised the price of crude oil (Cassady, de Chazeau and Kahn). State conservation has not done a good job of conserving (de Chazeau and Kahn). There are natural monopoly elements in petroleum transportation, but regulation has largely removed this difficulty (de Chazeau and Kahn). There is workable competition in refining and marketing (Cassady). Although vertical integration can cause trouble to competition and competitors, and has in fact somewhat impeded entry into refining, it is not necessarily inimical to competition (de Chazeau and Kahn). In fact, except for problems in crude oil, the petroleum industry in the United States has a good record of efficiency and progress, and is probably ‘effectively competitive’. The trilogy thus reflects anything but single-mindedness amongst the authors. In the abstract this may seem to be a defect. Under the circumstances, however, I would argue that it is a virtue.
The bibliographies are valuable. Everyone who has a special interest in petroleum will want to read these volumes. But he has a chore in store for him. The pity is that this is such a modest step toward understanding an important and fascinating industry. The fundamental work has yet to be done.

THE UNIVERSITY OF CHICAGO