AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

AFFILIATED SHAREHOLDING, MANAGEMENT, AND DEBT IN THE PETROLEUM INDUSTRY: EFFICIENCY OR MONOPOLY OBJECTIVES?

by Duane Chapman*

November 1981 No. 81-28

This is the text of a paper delivered at the Third Annual Meeting of the International Association of Energy Economists, held on November 12-13, 1981 in Houston, Texas.

*Associate Professor of Resource Economics, Department of Agricultural Economics, Cornell University, Ithaca, New York 14853.

Copyright © 1981, Duane Chapman, all rights reserved.

Preface and Acknowledgement

This paper draws upon the author's own current and previous work. Theresa Flaim and Kathleen Cole have contributed significantly to that earlier work[1/], and to my understanding of the subject. Lucrezia Herman, Angelina Chueh, and Korin Jones are thanked for their assistance. The material in this paper will be included in Chapter 7 of Energy Resources and Energy Corporations, to be published by Cornell University Press. Comment and criticism are welcome.

ABSTRACT:

Affiliated Shareholding, Management, and Debt in the Petroleum Industry: Efficiency or Monopoly Objectives?

by Duane Chapman, Cornell University

Historically, the perspective critical of the industry has viewed multiple affiliations as structural proof of behavioral misconduct. Wilson, Blair, and Medvin might be associated with this view. The perspective which makes an arguable case for the existence of a competitive industry generally sees affiliations as infrequent and unimportant. This paper presents empirical data on structural affiliations between major petroleum corporations, summarizes the most important relevant legislation, and examines the economic incentives which underlie the present structure. The areas of affiliation which are examined are share ownership, debt-holding, management, and shared production facilities. The conclusions are three-fold: First, structural affiliations are extensive. Second, the largest major firms are formally defined as management-controlled, and employee investment plans have become the largest owners for the very largest companies. Third, the particular structure which has evolved has been efficient in the sense of lowering management and production costs.

The financial performance of the companies seems unaffected by the owner-management relationship. The current profitability of the four owner-influenced firms is no higher than that found for the management-controlled firms, and the firm with the highest profitability is a subsidiary of a company whose largest owner is a foreign government.

As a matter of fact, nine-tenths of the stockholders of the Standard Oil Company are now and always have been Republicans. Within my knowledge there are but two Democrats who have ever been stockholders in the Company. --Sen. Oliver Payne, 1888

If "socialism" is defined as "ownership of the means of production by the workers" . . . then the United States is the first truly "socialist" country. Through their pension funds, employees of American business today own at least 25 percent of its equity capital, which is more than enough for control. --Peter Drucker, 1976[2/]

Ownership and Control

Few subjects stimulate more contradictory responses than does the question of ownership, management, and control of petroleum companies. Perhaps this is because the subject is so closely linked to the economic theories of competition and monopoly. Those theories are in turn often used to criticize or defend particular characteristics or actions of the industry. Followers of the conventional profit-maximizing monopoly theory have sought and found evidence that the owners and managers of major oil companies are affiliated with one another. Adherents to the competitive theory can argue that the major companies are in clear conformity to anti-trust law

and regulation, and might also advance the proposition that major oil companies may--in general--give great weight to anti-trust law and potential conflict of interest in formulating their executive management structure.

Proponents of the Galbraithian view of growth-oriented great corporations can adopt each of the preceding views of their opponents, and add an additional emphasis to the significant general separation of ownership and management[3/].

Norman Medvin, a critic of the industry, reviewed the data on the subject of this paper and concluded, simply, "The basic approach should be to break up the control relationships which make joint action possible[4/]." John Blair, a major critic of the industry in the middle years of this century, shared this concern, concluding his review by arguing that: "Through interlocking corporate relationships and joint ventures of every conceivable form, the opportunities for substituting collective for individual judgment are legion[5/]." Perhaps John Wilson put the critics' case most persuasively:

> They must work together to further their joint interests.... But it is, most assuredly, not the kind of institutional setting within which a free market economy can be expected to function efficiently. Real economic competition is made of tougher stuff.... In order to function both efficiently and in the public interest, free markets must be competitive. This means that the participants must be structurally and behaviorally independent of each other. That precondition, quite apparently, does not apply to the petroleum industry[6/].

However, as shall be seen, the empirical evidence can be interpreted not only to strengthen the Wilson-Blair position, but the evidence also provides

support for interpretations which oppose the Wilson-Blair position.

Table 1 shows 1980 data for stock control by the six largest shareholders of America's largest oil companies. Several important points are evident. First, there are forty-two investment positions: seven oil companies, six largest investors. But in only two cases does a single investor hold 5% of the stock. These two cases are Standard Oil of California, where the Crocker National Corporation has 10.7% of the voting stock, and Gulf Oil, where the Mellon National Corporation holds 6.2%. This is significant because economists have generally concluded that five to ten percent shareholding is necessary for a shareholder to have the potential for controlling the company[7/]. The earlier Cornell Study in 1974 of all the major petroleum companies had similar findings. The survey identified just four companies in which a single interest held 10% or more of their stock. The data are in Table 2 for these four companies.

A rough generalization might be put this way: two of the largest American companies--Socal and Gulf--could have significant potential for being influenced by their largest shareholder. Two of the other largest majors--Sohio and Shell--are subsidiaries of European oil companies. Four of the smaller majors in Table 2 may have large holdings by individuals or families which are substantial enough to guarantee considerable responsiveness by management. This leaves 12 of the 18 American companies which are probably management controlled.

Management control does not mean management is unresponsive to shareholders large and small. It does imply that shareholders are one of many interest groups. For a management controlled petroleum company, shareholders as a group are simply near the front of a crowd of contending interests which include OPEC, employees, consumers, debt holders, and government.

Returning to Table 1, it is evident that financial institutions are the

Table 1. Six largest Institutional Shareholders in Largest American Petroleum Corporations

Percent of common stock voting shares owned or managed, 1980

EXXON	% of stock
Chase Manhattan	1.7%
Mfg Hanover	1.3
J P Morgan	1.1
TIAA/CREF	1.0
Fayez Sarofim	0.9
Citicorp	0.8
Total	6.8%

TEXACO	
Union National Bank	1.0%
Nat'l Detroit Corp	0.9
TIAA/CREF	0.9
Fayez Sarofim	0.8
Continental Ill	0.7
Mfg Hanover	0.6
Total	4.9%

GULF OIL	
Mellon National	6.2%
TIAA/CREF	1.4
Prudential Ins	1.3
J P Morgan	1.3
First Tulsa Bancorp	1.1
Fayez Sarofim	0.8
Total	12.1%

ATLANTIC RICHFIELD	
Security Pacific Corp	2.9%
Citicorp	2.4
Mfg Hanover	2.0
Marsh & McLennan	1.3
Prudential Ins	1.0
Calif Pub Emp Ret Sy	1.0
Total	10.6%

MOBIL	% of stock
J P Morgan	2.4%
Nat'l Detroit Corp	1.6
Bancoklahoma	1.3
Chase Manhattan	1.2
Fayez Sarofim	1.0
Prudential Ins	1.0
Total	8.5%

STANDARD OIL-CALIFORNIA	
Crocker National	10.7%
Chase Manhattan	1.3
Fayez Sarofim	1.0
Mfg Hanover	0.9
Wells Fargo	0.8
J P Morgan	0.7
Total	15.4%

STANDARD OIL-INDIANA	
Fayez Sarofim	1.2%
Citicorp	1.1
Chase Manhattan	1.1
Harris Bank Corp	1.1
Nat'l Detroit Corp	1.0
First Chicago Corp	0.9
Total	6.5%

Source: Structure of Corporate Concentration, Vol. 1, pp. 69-71.

Table 2. 1974 Survey of Controlling Interests

Major U.S. Petroleum Companies

Companies with at least 10% of the stock held by a single interest	Shareholder, and percentage held
Amerada Hess Corporation	Leon Hess, 20%
Getty Oil Company	J. Paul Getty, 64%
Occidental Petroleum	Large but unidentified interest held through the New York Stock Exchange
Sun Oil Company	Glenmede Trust Company, 39% representing Pew Memorial Trust

Source: Chapman et al., Structure of the Petroleum Industry: Summary of Survey Data, pp. 14-16.

major shareholders. All 42 entries are banks, investment companies, pension funds and their managers, or insurance companies. Shareholding actually takes many forms. It may be direct ownership, or management of stock which is owned by trusts, pension plans, estates, individuals, or corporations. The bank itself may be a nominee in managing the stock, or it may ask another organization to act as nominee.

It may be surprising to learn that these 42 large owners are generally not represented on the boards of directors of the companies. On the average, only two of the six largest shareholders will be represented on the board, and usually one of these two directors will also be on the board of the very largest shareholder.

The final observation about the Table 1 ownership data is its interconnectedness. All of the seven companies share at least one major shareholder with each of the other companies. Table 3 will be used to summarize much of the data on ownership and management. On shareholding, for example, Table 3 shows that Exxon and Mobil share three large stockholders (i.e., S3 for the Exxon/Mobil pair). These three joint shareholders, of course, can be identified in Table 1.

The 1980 study found that thirty-six large investors held stock in all 7 oil companies.

No information was available on large individual owners in the 1980 study. Considering the role of the Rockefellers in the economic history of petroleum, it is interesting to note John Blair's report that in 1938 the Rockefeller family averaged a 15% equity position in Exxon, Mobil, and the Standards of Indiana and of California[8/]. In the 1974 Cornell Study, however, no evidence of such large interests was found.

Affiliated ownership grows more complex by examining the second

Table 3. Summary of Ownership and Management Affiliations, Largest Oil Companies

	Mobil	Texaco	Stnd./Cal.	Gulf	Stnd./Ind.	At. Rich.	Royal Dutch/ Shell	Brit. Pet. Stnd./Ohio
Exxon	S3,D9,T	S3,D2,T	S4,D6,A,T	S3,D1	S3,D8,A,T	S2,D5,T	D1,A	D2,T
Mobil		S2,D4,T	S3,D12,T	S3,T	S3,D5,T	S1,D2,T	D2,T	D2,T
Texaco			S2,D2	S2,T	S2,T	S1,T	T	T
Stnd./Cal.				S2,T	S2,A,T	S1,D12,T	A,T	D1
Gulf					S1,T	S1,A,T	D1,T	
Stnd./Ind.						S1,D6,T	D1,A,T	
At. Rich.							D1,T	D1,T
Royal Dutch/ Shell								D1,A

S = shared institutional shareholders among largest 6 in each company. Thirty-six large investors held stock in all 7 oil companies, 1980.
D = the same firm is represented on the board of a pair of oil companies, 1980.
A = shared accountants, 1980.
T = shared debtholders among largest 10 for each oil company for debt with at least five years original term, as of Jan. 1, 1974.

Sources: Structure of the Petroleum Industry: Summary of Survey Data; T. Flaim, Antitrust Bulletin; and Structure of Corporate Concentration. Data on 1980 shareholders ("S") was not available for Royal Dutch Shell and British Petroleum-Standard Oil of Ohio.

level: ownership of the bank corporations which are the major owners of the petroleum companies. In Table 1, the Chase-Manhattan Corporation is the largest shareholder in the largest oil company. But Chase-Manhattan's largest shareholder is another banking corporation, Citicorp. Citicorp itself is a large shareholder in Exxon, Standard of Indiana, and Atlantic Richfield. As the pattern becomes evident, it will be no surprise to report that the largest shareholder in Citicorp is J P Morgan, and J P Morgan is in turn the largest shareholder in Mobil[9/].

It should be noted that the banking companies owning oil companies will be completely or almost completely bank holding companies. National banks are prohibited from direct investment of their funds in stock of companies outside of banking or finance. However, a bank may be owned by a bank holding company, and this second kind of company can in general own a maximum of 5% of the stock of a non-financial corporation[10/].

While the evidence is amenable to several interpretations, it seems clear that major petroleum companies are not controlled by blocks of large private shareholders.

Supposing this conclusion, why, then, is it common for large investors to have positions among several petroleum companies? One reason may be an economy of scale. Petroleum is complicated, and much effort is needed to gain a confident understanding of a single company and its role in the industry. Once a financial institution has done so for a single company, it will be easier to do so for the second company, and still easier for the third.

At the same time, the investment policies of the major financial institutions give petroleum company management some signals about how that petroleum company is viewed by investors. Generally, stock market prices for an individual company may be influenced by three factors. These factors

are the general state of the stock market, the relative financial strength of the petroleum industry in the stock market, and the comparative position of the individual oil company with respect to other oil companies. When a large investor sells stock in oil company A and buys stock in oil company B, the managements of A and B each learn something about how their financial strengths are perceived.

A third reason is simply size itself. Large financial institutions have sizable assets, and petroleum companies absorb much capital.

Having clarified the patterns and motivations for shared ownership, it may be concluded that, for most of the major oil companies, largest shareholders are financial institutions. These leading institutions commonly own small percentages of several oil companies, and of each other.

Management

However, Drucker's assertion of pension fund ownership now becomes relevant. While Tables 1 and 3 have summarized institutional shareholding in the largest American oil companies, the largest blocks of stock in six of those companies are actually held by employees of the companies. In Exxon, Mobil, Socal, Standard/Indiana, Atlantic Richfield, and Texaco, employee investment plans have more stock than any other shareholder[11].

I think it reasonable speculation to suppose that management is a major participant in these employee stock plans.

Since the major companies have their own stock plans as largest shareholders, and, in general, single blocks of shares do not exceed 10% of voting stock, it seems a fair conclusion to assume that the largest major oil companies are controlled by management rather than owners. In arriving at this conclusion we are making a specific determination of a general question. Larner's detailed

1963 analysis concluded that management control was typical for the 500 largest nonfinancial corporations.

The 20 largest oil companies in Larner's 1963 study are, as indicated in Table A-1 of the Appendix, essentially the same group as in 1954 or 1979[12]. Larner had concluded that 15 were management-controlled and 5 owner-controlled. However, the 5 owner-controlled companies included two that were subsidiaries of management-controlled firms. Shell was identified as owner-controlled. But Shell (U.S.A.) is a subsidiary of Royal Dutch Shell. In 1963, Richfield was also identified as owner-controlled. The major two owners were Cities Service and Sinclair. Since 1963, both Sinclair and Richfield have become part of Atlantic-Richfield.

The question "Does it matter? Does owner-control versus manager-control matter?" has not yet been addressed. It remains for the concluding section of the paper. However, it seems likely that the very largest oil companies should be viewed as management-controlled, and some of the lesser majors (and Gulf) are more likely to be owner-influenced. I would suppose that as the size of the oil company decreased below a billion dollars in annual sales, owner influence would be increasing.

The typical Board of Directors of a major oil company will have approximately 15 members, about one-half of whom are inside directors and one-half of whom are outside directors. The inside directors are management executives in the company, and the outside directors are not employees of the company. While the shareholders have the formal responsibility of electing directors, the nominating committee of the board has the larger role. In this limited sense, boards may be viewed as self-selecting.

Formally, the responsibility of a board of directors of a major oil company is quite large. Its domain includes investment decisions, product

determination, employee wages, executive salaries, dividend payments, and debt authorization. In practice, I would think it conservative to assert that corporate managements dominate many of these decisions. And many observers share a similar view[13].

Table 3, in addition to its shareholding affiliations, reports interlocking directorates amongst the largest majors. Twenty-three inter-connections are shown between the 9 companies. Is this legal? The Clayton Act asserts:

> ... no person at the same time shall be a director in any two or more corporations ... if such corporations are or shall have been ... competitors, so that the elimination of competition by agreement between them would constitute a violation of any of the provisions of any of the antitrust laws[14].

These 23 multiple director affiliations do not in any way violate the Clayton Act. They consist of two persons from a third firm serving on the boards of two oil companies. For example, in 1980, William J. DeLancey and Martha Peterson were on the board of Metropolitan Life. DeLancey was also on Sohio's board, while Peterson served on Exxon's board. John Place, also from Metropolitan's board, was on Arco's board. Superficially, this would seem to be in contradiction with the Clayton Act. Here are Ms. and Mr. A, B, and C, all on the board of one of the largest investors in major oil companies, and A, B, and C are also on the board of three major oil companies.

But the significance of these affiliations must be viewed in the context of the economic organization of production, refining, and marketing which has been developed in the petroleum industry. Sohio, Exxon, and Arco must work closely together in Alaska, because this is the only possible way to achieve

maximum recovery of the oil in place. In the early 1970's in the rest of the United States, Sohio shared ownership with Exxon in 2200 producing oil wells, and in 3400 wells with Arco. Shared ownership is extensive. Ashland owned wells in partnership with each of the other 19 major oil companies. This is typical of the relationships in Appendix Table A-2. Similar cooperative arrangements exist in transportation, refining, and marketing.

In this context, the three directors can create no potential for restraint of trade which had not already been given prior existence through these cooperative activities. If the assumption is granted that cooperation in production, refining, marketing, and transportation gives increased efficiency and lower cost, then management affiliation would not by itself alter a system which has focused on efficiency.

It seems likely that these multiple directorate affiliations are analogous to the multiple ownership affiliations in the preceding section, and have similar economic motivations and functions.

The significance of multiple director affiliations is lessened still again by reference to the relatively minor role directors play in the management of large corporations.

In one important area it is evident that the companies are very sensitive to potential conflicts of interest for their directors. There is not any single person who is on one of the petroleum company boards, and also serving on the board of directors for an automobile company, or a major supplier of equipment to the petroleum company. The motivation for eliminating such ties is to remove the potential conflict whereby, for example, a director would work to secure a special contract between an equipment manufacturer of offshore drilling rigs and an oil company. Such special contracts could benefit the director personally, but create financial and other problems for the oil company. Hence the

motivation for the absence of such director ties.

One problem of this sensitivity, however, is to make cooperation more difficult when such cooperation may be economically efficient. More direct association between petroleum company and automobile company management may have made easier the transition to smaller cars using less gasoline with less air pollution emissions.

Finance

Debt-holding indicates the same pattern of multiple affiliations as has been described for ownership and boards of directors. In Table 3, "D4" for Mobil and Texaco means that the 1974 Cornell survey reported four financial institutions were major debt holders for both Mobil and Texaco. Metropolitan Life Insurance was the leader: it was a large debtholder for 13 of the 20 largest companies[15/].

Table 3 shows affiliated large debtholders for 23 of the pairs of companies. The economic incentives for this pattern are presumably similar to those incentives described above which have led to multiple affiliations in ownership and boards of directors.

Auditing of financial practices is an important function linking finance and management. Basically, the independent accountants which audit the petroleum companies are expected to guarantee that financial and operating data are accurately reported, that a company's position with respect to oil reserves and other assets is reasonably described, and that financial data is fairly presented. The complexity and size of the industry creates an economy of scale which leads some few accounting firms to provide auditing services for several major oil companies. Five accounting firms act as independent auditors and accountants for all 20 major companies and the two international parents, Royal Dutch/Shell

and British Petroleum[16]. Affiliations between the largest majors where they share accounting firms is also shown in Table 3. For example, Exxon and Royal Dutch/Shell each have Price-Waterhouse as accountants.

The question which arises here is to inquire what incentives may exist which prevent a single firm from becoming the auditor for all major companies. I speculate that the motivation is a desire on the part of management to avoid a position whereby its auditors would themselves be placed in a position of potential conflict of interest by controlling the formal publication of all major company data.

As in many other aspects of the industry, economics of scale and affiliation are considerable, but are nervertheless limited.

In the 1980's, American petroleum corporations have unique opportunities and problems in terms of the industry's financial situation. On the positive side, its revenues have continued to increase regularly. Profit levels have increased, but not regularly.

Exxon is probably representative of the major differences between 1972 and 1980. The outstanding change is size: revenue grew 5 times as a result of OPEC price increases as indicated in Table 4.

Profit can be measured in many ways. Two common measures are net income and funds earned from operations. The latter concept defines cash income after expenses, while net income subtracts allowances for depreciation of plant and equipment, and depletion of oil, gas, and coal resources. Net income also subtracts deferred income taxes. Consequently, funds from operations are greater than net income.

In 1972, Exxon earned a 13% rate of return in terms of net income as a percentage of shareholders equity, and a 25% return for funds from operations. In 1980, the rates of return are much higher, being 25% for net income and 48%

Table 4. Basic Financial Data, Exxon, 1972 and 1980

$ Billion

	1972	1980
A. INCOME and FUNDS		
Revenue	$22.4	$110.4
less Expenses	-20.9	-104.7
Net Income	$ 1.5	$ 5.7
Add to Net Income:		
Depreciation, depletion	+1.1	+2.3
New deferred income taxes	+0.2	+1.8
Other additions	+0.1	+1.0
Total Funds from Operations	$ 2.9	$ 10.8
Financial Transactions	+0.1	-1.1
Net Increase in Debt	+0.5	+0.1
Total Funds Available and Utilized	$ 3.5	$ 9.8
B. CAPITAL ITEMS		
Long term debt	2.6 (16%)	4.7 (12%)
Deferred income taxes	0.8 (5%)	6.2 (16%)
Annuity reserves, etc.	0.6 (4%)	2.0 (5%)
Capital stock	2.6 (16%)	1.7 (4%)
Retained Earnings	9.6 (59%)	23.7 (62%)
Total Capital Items	16.2 (100)	38.3 (99%)
C. SHAREHOLDERS EQUITY		
Amount, beginning of year	$11.6	$ 22.6
Amount, end of year	$12.3	$ 25.4
Net income, % return beginning of year	13%	25%
Operating funds, % return beginning of year	25%	48%

Source: Annual Reports, 1972 and 1980.

for funds from operations.

Rising profitability in the 1970's has led to a re-arrangement of capital structure. For Exxon, retained earnings rose in value as well as in proportion to other selected capital items. Capital stock held by shareholders actually declined in amount and percentage as Exxon bought back stock over the 1970's. The interaction of rising profit and increased tax incentives led to a growth in deferred taxes which had contributed $6 billion to Exxon's capital in 1980.

Growth in profit also led to a reduction in the significance of long-term debt over the 1970's, as it declined from 16% to 12% of capital investment in Table 4[17].

The negative entry of -$1.1 billion in 1980 for financial transactions reflected a 1980 financial loss caused by a significant growth in Exxon's petroleum inventories in 1980. The inventory growth occurred because of lower product sales in 1980.

In Appendix Table 1, funds from operations for major companies total $54 billion. Exxon, with $10.8 billion, is the largest. In fact, the Fortune survey of largest industrial companies in 1980 showed that the 20 major oil companies had 37% of the total $81 billion net income earned by the 496 private companies in the survey[18].

Table 5 shows how Exxon used its funds in 1980. Dividend payments are significant, as are continued investment in foreign and U.S. oil and gas production facilities. However, it should be noted that investment in U.S. refining, marketing, and transportation is not large.

As opportunities for profitable oil and gas development continue to decline in proportion to the industry's revenue and profit, major changes must be anticipated in the kind of picture which is shown in Table 5. Future investments must necessarily be in non-energy areas and in other energy and mineral resources.

Table 5. Application of Funds in 1980, Exxon

$ Billion

Shareholder dividends	2.4	24%
Investment in U.S. oil and gas exploration and production	1.8	18%
Investment in foreign oi and gas exploration and production	1.9	19%
Investment in foreign refining and marketing facilities	0.8	8%
Investment in U.S. refining and marketing facilities	0.2	2%
Investment in transportation	0.2	2%
Other property, plant, and equipment	1.7	17%
Purchase of Exxon shares by company	0.4	4%
Increase in cash and securities	0.4	4%
Total Funds Available and Used	9.8	98%*

Source: Exxon Annual Report 1980.

*Rounding error is responsible for 98% rather than 100% sum.

Interpretation: Efficiency or Monopoly

It is useful to think of the 114-year history of the petroleum industry from 1859 to 1973 as the Growth Era. During this period--and particularly in the 28 years after World War II--the basic performance characteristics were accelerating production and consumption, declining real prices of petroleum products, and normal profitability for the petroleum industry. Since 1973, growth in consumption continued at a lesser rate to 1978, and has since declined to pre-1973 levels. Real product prices generally fell in the 1974-78 period, but are now much higher than at the end of the Growth Era. Profitability has fluctuated widely since 1973, but there are recurring years of very high returns.

My interpretation of these factors leads to the proposal of a three-period perspective. During the Growth Era, affiliation in ownership, management, and finance complemented cooperation in production, refining, transportation, and marketing. The eight years since are a transitional period in which the Growth Era's efficiency objectives of increased sales and lowered costs and prices can no longer be attained. I foresee a high probability that the petroleum industry--regardless of the subjective goals of individual managements--will be transformed in the third period into an industry which will be accurately described in the near future as a profit-maximizing monopoly.

In this context, management affiliation, originally developed in a structure which promoted efficiency objectives, may become part of the means by which the industry is so transformed.

To this point, no differentiation has been made between U.S. and foreign petroleum industries or between government and private petroleum companies. The available evidence indicates that, to date, technology, geology, and economics have been more significant than national background or ownership title in the development of the industry's structure. Multiple affiliation in

ownership and management is international, and equally applicable to European and Japanese corporations[19].

It is not clear how the degree or type of ownership influence affects the actual management of the companies. Robert Larner's study in the late 1960's concluded that the degree of owner influence did not affect profitability. However, Miron Stano found that owner-controlled firms had significantly better performance in the stock market, and Salamon and Smith find that management-controlled firms are more likely to use accounting policies to misrepresent firm performance[20].

In Appendix Table A-1, the highest rate of return is earned by Standard of Ohio, the company owned by British Petroleum which is the company controlled by the British Government. Apparently, the public/private ownership question did not affect profitability. The four probable owner-influenced oil companies (Gulf, Amerada-Hess, Occidental, Sun) have an average rate of return of 22%, the same return for the 15 privately owned management-controlled oil companies. The kind of control (public/private, management/owner) does not, in the 1980's, give a confident guide to the performance of the company.

The final observation is to note the significance of similar organizational patterns between publicly owned and privately owned companies. The organization of British Petroleum and CFP (the French Petroleum Company) is similar to the organization of private American oil companies. Yet both BP and CFP have governments as their largest shareholders.

Finally, a warning about public ownership. The two major efforts to create profit monopolies in energy have both involved government corporations or agencies. OPEC, of course, is well known. Less widely known is the effort of one or more American oil companies to work with Canadian, South African, and Australian governments and corporations to establish a uranium cartel in the

early 1970's[21]. Whatever the future potential for economic power which is created by the incentives for affiliations in ownership, mangement, and finance, it cannot be supposed that public ownership in and of itself will provide a remedy to the problem.

In summary, the long Growth Era experienced the successful attainment of efficiency objectives in consumption growth and declining real prices. Multiple affiliations in ownership, management, and finance complemented the cost-minimizing effects of cooperation in production and distribution.

The present transitional period sees fluctuation in production, consumption, real prices, and profitability.

The final era of the petroleum industry may be the Monopoly Era in which global production fluctuates but slowly declines from a 1979 peak, and brief periods of decline in real product prices are interrupted by severe real price increases.

The available evidence, although limited, suggests that multiple affiliations are international and economic in nature. Also, public ownership of petroleum companies apparently does not by itself affect these patterns, and public oil corporations and agencies cannot be seen as barriers to the emergence of monopoly economics.

FOOTNOTES

1. See Flaim, "The Structure of the U.S. Petroleum Industry: Concentration, Vertical Integration, and Joint Activities;" Flaim, "The Structure of the U.S. Petroleum Industry: Joint Activities and Affiliations;" and Chapman, Flaim, Cole, Locken, and Flaim, The Structure of the U.S. Petroleum Industry: A Summary of Survey Data.

2. Senator Payne was quoted in Ida Tarbell, The History of Standard Oil Company, 2 vols, (1907), Vol. 1, p. 118. Drucker's observation is from his The Unseen Revolution, (1976), p. 1.

3. John Kenneth Galbraith, Economics and the Public Purpose, 1973, especially Chapter 9.

4. Norman Medvin, The American Oil Industry: A Failure of Anti-Trust Policy, (1973), p. 121.

5. John Blair, The Control of Oil, (1976), p. 136.

6. Cited in Blair, p. 136.

7. According to Robert Larner, Management Control and the Large Corporation, (1970), p. 779; Gerald L. Salamon and E. Dan Smith "Corporate Control and Managerial Misrepresentation of Firm Performance," The Bell Journal of Economics, (Spring 1979) Vol. 20, No. 1, p. 322; and Miron Stano, "Monopoly Power, Ownership Control, and Corporate Performance," The Bell Journal of Economics, (Autumn 1976), Vol. 7, No. 2, p. 678.

8. Blair, p. 149.

9. The shareholding data on bank corporations are also from U.S. Senate, Committee on Governmental Affairs, Structure of Corporate Concentration, Committee Print, (December 1980) Vol. 1, p. 33.

10. See Pauline Heller, Handbook of Federal Bank Holding Company Law, (1976), p. 221.

11. Structure of Corporate Concentration, p. 22. Crocker National in Table 1 is probably representing the Standard/California employee investment plan.

12. Larner, Appendix A. Although Larner used assets as a measure of size in 1963, the companies in Appendix Table A-1 are identical in 1954, except Larner has Sunray DX rather than Occidental as one of the 20 largest. Sun Oil is now the formal owner of Sunray.

13. Peter Drucker, "The Bored Board," The Wharton Magazine (Fall 1976) Vol. 1, p. 19; Harry Henn, Handbook of the Law of Corporations and Other Business Enterprises, (1961), pp. 337-339; William Knepper, Liability of Corporate Officers and Directors, 3d ed., (1978), pp. 5-16.

14. Cited in U.S. House of Representatives Committee on the Judiciary, The Antitrust Laws: A Basis for Economic Freedom, Staff report to the Antitrust Subcommittee, (1965), p. 8.

15. Chapman et al., p. 19.

16. These five firms are Arthur Andersen & Co., Arthur Young & Co., Coopers & Lybrand, Ernst & Whinney, and Price-Waterhouse & Co.

17. Standard of Ohio has an unusual amount of debt for U.S. petroleum companies in the 1980's. Because of its Alaskan investments, its long-term debt was nearly half of its capital. This is declining rapidly, however, because of Sohio's profit levels.

18. Fortune, 4 May 1981. The 500 largest industrial companies in the survey include 4 nonprivate cooperatives that do not use the net income concept of profit.

19. Empirical data in Europe and Japan is discussed in P.S. Johnson and R. Alps, "Interlocking Directorates among the UK's Largest Companies," Antitrust Bulletin, reprint from (Summer 1979) Vol. 24, pp. 357-369; and in F.M. Scherer, Industrial Market Structure and Economic Performance, (1970), p. 45.

20. Larner, Management Control; Salamon and Smith, "Corporate Control and Managerial Misrepresentation of Firm Performance;" and Stano, "Monopoly Power, Ownership Control, and Corporate Performance," cited above.

21. Described in Geoffrey Rothwell, "Market Coordination by the Uranium Oxide Industry," Antitrust Bulletin, (Spring 1980) Vol. 25, pp. 233-268.

Appendix Table A-1. Major Oil Companies: Economics, 1980

Company	Revenue ($ billion)	Assets ($ billion)	Funds earned on operations ($ billion)	Net income ($ billion)	Stockholders' equity ($ billion)	Net income (as a % of stock. equity)
1. Exxon	110.380	56.577	10.778	5.650	25.413	22.2
2. Mobil	63.726	32.705	4.823	3.272	13.069	25.0
3. Texaco	52.485	26.430	4.358	2.643	12.526	21.1
4. Standard/Calif.	42.919	22.162	3.972	2.401	11.077	21.7
5. Gulf	28.790	18.638	2.955	1.407	9.637	14.6
6. Standard/Ind.	27.832	20.167	3.618	1.915	9.385	20.4
7. Atlantic Rich.	24.578	16.605	3.247	1.651	7.439	22.2
8. Shell	20.753	17.615	2.989	1.542	8.100	19.0
9. Conoco	18.766	11.036	1.832	1.026	4.585	22.4
10. Phillips	13.713	9.844	1.928	1.070	4.937	21.7
11. Tenneco	13.488	13.853	1.531	.726	4.164	17.4
12. Sun	13.242	10.955	1.542	.723	4.311	16.8
13. Occidental	12.726	6.630	1.364	.711	2.054	34.6
14. Standard/Ohio	11.379	12.080	2.591	1.811	4.562	39.7
15. Getty	10.437	8.267	1.675	.872	4.144	21.0
16. Union/Calif	10.437	6.772	1.415	.647	3.477	18.6
17. Marathon	8.754	5.043	.801	.379	1.923	19.7
18. Ashland	8.520	3.358	.361	.205	.917	22.4
19. Amerada Hess	7.955	5.895	1.047	.540	2.357	22.9
20. Cities Service	7.898	5.358	1.002	.478	2.579	18.5
Totals	$508.778	$309.990	$53.829	$29.669	$136.656	21.7%

Note: Revenue includes sales, other operating revenues, excise taxes, interest income, and equity in earnings of affiliates. Assets include total current assets plus investments, advances, net properties, plant and equipment. Net income includes extraordinary items such as property sales. Data are for worldwide operations, with the exception of Standard of Ohio and Shell which are U.S. subsidiary affiliates of foreign oil companies. Ashland data are for year ending September 30, 1980; all other data are for year ending December 31, 1980.

Sources: Company Annual Reports for 1980; Fortune, May 4, 1981

Appendix Table A-2.

—U.S. OIL WELLS JOINTLY OWNED AMONG MAJOR AND NON-MAJOR [1] PETROLEUM FIRMS IN 1973

Reporting company	Total wells in which reporting company owns an interest	Total wells owned with others	Major petroleum firms with whom wells are owned		Wells jointly owned with each major as a percent of reporting firm's total joint wells
			Company name	Number of gross wells	
SEC. A: MAJOR PETROLEUM FIRMS [2]					
Ashland Oil, Inc.	6,471	4,867	Amerada Hess Corp.	226	5
			Atlantic Richfield Co.	1,149	24
			Cities Service Co.	496	10
			Continental Oil Co.	539	11
			Exxon Corp.	936	19
			Getty Oil Co.	796	16
			Gulf Oil Corp.	483	10
			Marathon Oil Co.	112	2
			Mobil Oil Corp.	619	13
			Phillips Petroleum Co.	482	10
			Shell Oil Co.	101	2
			Standard Oil of California	390	8
			Standard Oil of Indiana	1,024	21
			Standard Oil of Ohio	742	15
			Sun Oil Co.	409	8
			Tenneco, Inc.	342	7
			Texaco, Inc.	1,001	21
			Union Oil of California	184	4
Cities Service Co. [3]	14,715	10,818	Amerada Hess Corp.	2,228	21
			Ashland Oil, Inc.	473	4
			Atlantic Richfield Co.	6,514	60
			Continental Oil Co.	3,886	36
			Exxon Corp.	3,676	34
			Getty Oil Co.	5,116	47
			Gulf Oil Corp.	3,719	34
			Marathon Oil Co.	1,898	18
			Mobil Oil Corp.	4,069	38
			Phillips Petroleum Co.	4,433	41
			Shell Oil Co.	2,440	23
			Standard Oil of California	837	8
			Standard Oil of Indiana	3,877	36
			Standard Oil of Ohio	1,301	12
			Sun Oil Co.	3,763	35
			Tenneco, Inc.	938	9
			Texaco, Inc.	5,120	47
			Union Oil of California	1,764	16
Occidental Petroleum Corp.	359	294	Exxon Corp.	13	4
			Gulf Oil Corp.	22	7
			Shell Oil Co.	18	6
			Standard Oil of California	27	9
			Sun Oil Co.	1	(*)
			Tenneco, Inc.	1	(*)
Standard Oil of California	11,168	3,298	Amerada Hess Corp.	1,125	34
			Ashland Oil, Inc.	14	(*)
			Atlantic Richfield Co.	1,355	41
			Cities Service Co.	1,039	32
			Continental Oil Co.	1,587	48
			Exxon Corp.	1,113	34
			Getty Oil Co.	1,781	54
			Gulf Oil Corp.	1,190	36
			Marathon Oil Co.	1,001	30
			Mobil Oil Crop.	1,463	44
			Occidental Petroleum Corp.	23	1
			Phillips Petroleum Co.	1,417	43
			Shell Oil Co.	389	12
			Standard Oil of Indiana	1,620	49
			Standard Oil of Ohio	1,253	38
			Sun Oil Co.	1,298	39
			Tenneco, Inc.	1,025	31
			Texaco, Inc.	1,664	50
			Union Oil of California	1,610	49

—U.S. OIL WELLS JOINTLY OWNED AMONG MAJOR AND NON-MAJOR [1] PETROLEUM FIRMS IN 1973—Con.

Reporting company	Total wells in which reporting company owns an interest	Total wells owned with others	Major petroleum firms with whom wells are owned		Wells jointly owned with each major as a percent of reporting firm's total joint wells
			Company name	Number of gross wells	
Standard Oil of Ohio	6,664	6,292	Amerada Hess Corp.	1,413	22
			Ashland Oil, Inc.	1,232	20
			Atlantic Richfield Co.	3,425	54
			Cities Service Co.	2,669	42
			Continental Oil Co.	2,340	37
			Exxon Corp.	2,210	35
			Getty Oil Co.	3,108	49
			Gulf Oil Corp.	2,947	47
			Marathon Oil Co.	1,821	29
			Mobil Oil Corp.	2,920	46
			Phillips Petroleum Co.	2,655	42
			Shell Oil Co.	685	11
			Standard Oil of California	829	13
			Standard Oil of Indiana	2,429	39
			Sun Oil Co.	3,028	48
			Tenneco, Inc.	1,304	21
			Texaco, Inc.	3,485	55
			Union Oil of California	1,016	16
SEC. B: NON-MAJOR PETROLEUM FIRMS [4]					
American Petrofina, Inc.	6,696	5,910	Amerada Hess Corp.	349	6
			Ashland Oil, Inc.	4	(*)
			Atlantic Richfield Co.	404	7
			Cities Service Co.	51	9
			Continental Oil Co.	78	1
			Exxon Corp.	115	2
			Getty Oil Co. [5]	[5] 209	4
			Gulf Oil Corp.	537	9
			Marathon Oil Co.	41	7
			Mobil Oil Corp.	556	9
			Phillips Petroleum Co.	345	6
			Shell Oil Co.	822	14
			Standard Oil of California	306	5
			Standard Oil of Indiana	527	9
			Standard Oil of Ohio	69	1
			Sun Oil Co.	333	6
			Tenneco, Inc.	42	1
			Texaco, Inc.	624	11
			Union Oil of California	132	2
Apco Oil Corp. [6]	4,612	4,488	Amerada Hess Corp.	64	1
			Atlantic Richfield Co.	786	18
			Continental Oil Co.	77	2
			Exxon Corp.	292	7
			Getty Oil Co.	861	19
			Gulf Oil Corp.	1	(*)
			Mobil Oil Corp.	578	13
			Shell Oil Co.	445	10
			Standard Oil of California	231	5
			Tenneco, Inc.	19	(*)
			Texaco, Inc.	52	1
			Union Oil of California	253	6
Crown Central Petroleum Corp.	1,231	125	Ashland Oil, Inc.	2	2
			Atlantic Richfield Co.	3	2
			Cities Service Co.	7	6
			Continental Oil Co.	2	2
			Exxon Corp.	7	6
			Phillips Oil Co.	10	8
			Standard Oil of Indiana	1	1
			Sun Oil Co.	1	1
			Texaco, Inc.	5	4
			Union Oil of California	7	6
Diamond Shamrock Oil & Gas Co.	975	294	Amerada Hess Corp.	1	(*)
			Ashland Oil, Inc.	2	1
			Continental Oil Co.	1	(*)
			Exxon Corp.	2	1
			Getty Oil Co.	1	(*)
			Gulf Oil Corp.	1	(*)
			Phillips Petroleum Corp.	7	2
			Shell Oil Co.	1	(*)
			Standard Oil of Indiana	2	1
			Union Oil of California	3	1
El Paso Natural Gas Co. [7]	46	[7] 36	Atlantic Richfield Co.	35	97
			Exxon Corp.	1	3
			Getty Oil Co.	1	3
			Standard Oil of California	1	3
			Sun Oil Co.		3

—U.S. OIL WELLS JOINTLY OWNED AMONG MAJOR AND NON-MAJOR [1] PETROLEUM FIRMS IN 1973—Con.

Reporting company	Total wells in which reporting company owns an interest	Total wells owned with others	Major petroleum firms with whom wells are owned			Wells jointly owned with each major as a percent of reporting firm's total joint wells
			Company name	Number of gross wells		
				Forest-operated wells	Partner-operated wells [2]	
Forest Oil Corp.[3]	2,642	2,503	Amerada Hess Corp.	1	180	7
			Atlantic Richfield Co.	0	1	(*)
			Cities Service Co.	104	0	4
			Continental Oil Co.	100	78	7
			Exxon Corp.	34	57	4
			Getty Oil Co.	15	90	4
			Gulf Oil Corp.	0	2	(*)
			Marathon Oil Co.	0	2	(*)
			Mobil Oil Corp.	0	156	6
			Phillips Petroleum Co.	68	81	6
			Shell Oil Co.	0	10	(*)
			Standard Oil of California	19	68	4
			Standard Oil of Indiana	101	423	21
			Standard Oil of Ohio	0	96	4
			Sun Oil Co.	108	29	5
			Tenneco, Inc.	2	17	1
			Texaco, Inc.	103	584	27
			Union Oil of California	0	2	(*)
				Unitized wells	Non-unitized wells [4]	
General American Oil Co. of Texas.[5]	6,793	5,878	Amerada Hess Corp.	2,139	6	36
			Ashland Oil, Inc.	568	1	10
			Atlantic Richfield Co.	3,176	16	54
			Cities Service Co.	2,157	4	37
			Continental Oil Co.	1,300	20	22
			Exxon Corp.	3,273	34	56
			Getty Oil Co.	3,010	16	51
			Gulf Oil Corp.	2,981	19	51
			Marathon Oil Co.	914	2	16
			Mobil Oil Corp.	2,870	28	49
			Occidental Petroleum Corp.	0	3	(*)
			Phillips Petroleum Co.	2,260	0	38
			Shell Oil Co.	2,084	2	35
			Standard Oil of California	18	12	1
			Standard Oil of Indiana	2,684	10	46
			Standard Oil of Ohio	670	6	12
			Sun Oil Co.	2,001	25	34
			Tenneco, Inc.	2,250	87	40
			Texaco, Inc.	2,256	17	39
			Union Oil of California	521	1	9
				Number of gross wells		Wells jointly owned with each major as a percent of reporting firm's total joint wells
General Crude Oil Co.	3,012	2,034	Ashland Oil, Inc.	125		6
			Atlantic Richfield Co.	318		16
			Cities Service Co.	235		12
			Exxon Corp.	148		7
			Gulf Oil Corp.	250		12
			Mobil Oil Corp.	116		6
			Standard Oil of California	265		13
			Standard Oil of Indiana	116		6
			Standard Oil of Ohio	32		2
			Sun Oil Co.	326		16
			Texaco, Inc.	376		18
			Union Oil of California	51		3
Lone Star Gas Co.	2,277	2,123	Amerada Hess Corp.	64		3
			Atlantic Richfield Co.	78		4
			Continental Oil Co.	150		7
			Exxon Corp.	10		(*)
			Getty Oil Co.[10]	[10] 11		1
			Gulf Oil Corp.	38		2
			Marathon Oil Co.	1		(*)
			Mobil Oil Corp.	3		(*)

—U.S. OIL WELLS JOINTLY OWNED AMONG MAJOR AND NON-MAJOR [1] PETROLEUM FIRMS IN 1973—Con.

Reporting company	Total wells in which reporting company owns an interest	Total wells owned with others	Major petroleum firms with whom wells are owned		Wells jointly owned with each major as a percent of reporting firm's total joint wells
			Company name	Number of gross wells	
			Shell Oil Co.	269	13
			Standard Oil of California	1,261	59
			Standard Oil of Indiana	31	1
			Standard Oil of Ohio	7	(*)
			Sun Oil Co.	35	2
			Tenneco, Inc.	4	(*)
			Texaco, Inc.	1	(*)
Louisiana Land & Exploration Co.	458	429	Amerada Hess Corp.	132	31
			Exxon Corp.	26	6
			Marathon Oil Co.	119	28
			Texaco, Inc.	153	36
			Union Oil of California	48	11
Pennzoil Co.	8,168	2,502	Atlantic Richfield Co.	199	8
			Continental Oil Co.	244	10
			Exxon Corp.	49	2
			Getty Oil Co.	39	2
			Gulf Oil Corp.	217	9
			Marathon Oil Co.	79	3
			Mobil Oil Corp.	202	8
			Phillips Petroleum Co.	100	4
			Shell Oil Co.	316	13
			Standard Oil of California	46	2
			Standard Oil of Indiana	80	3
			Standard Oil of Ohio	56	2
			Sun Oil Co.	2	(*)
			Tenneco, Inc.	27	1
			Texaco, Inc.	263	11
			Union Oil of California	1	(*)
Tesoro Petroleum Corp.	706	390	Ashland Oil, Inc.	39	10
			Atlantic Richfield Co.	41	11
			Gulf Oil Corp.	107	27
			Standard Oil of California	70	18
			Standard Oil of Indiana	99	25
			Sun Oil Co.	99	25
			Tenneco, Inc.	70	18
			Texaco, Inc.	175	45
			Union Oil of California	43	11
Total Leonard, Inc.	37	37	Shell Oil Co.	1	3

*Less than 0.5 percent.

[1] Major refers to those reporting companies among the 20 largest petroleum firms by sales for 1974. Non-majors are all firms excluding majors.

[2] Texaco, Inc. and Sun Oil Co. both listed all other majors as joint owners but did not specify the number of wells owned with each. All references to Shell Oil also include the Royal Dutch Shell group of companies.

[3] Cities Service Co.'s joint wells represent unitization agreements and do not reflect original lease agreements.

[4] Southwestern Oil & Refining Co. and Texas Oil & Gas Corp. listed joint owners but none were among the majors.

[5] Both Getty and its subsidiary Skelly were listed as partners in 103 wells in PAD 3; if these wells are the same then the total wells for Getty should be 106 and not the 209 listed here.

[6] Apco's joint wells are for the operators of partner-operated wells only.

[7] El Paso reported 31 joint wells in PAD 3 and 1 in PAD 4 for 1973. However, they also reported 35 wells owned with Atlantic Richfield in PAD 3 for 1973. Consequently, the total joint wells were assumed to be 36 for 1973. El Paso also reported separate data for its subsidiary Odessa Natural Gas Corp. which owned 112 gross wells and 34 joint wells in 1973. Data for Odessa were excluded from these calculations because of discrepancies in the data reported for years prior to 1973.

[8] Forest separated wells into Forest-operated and partner-operated. The identity of joint owners on partner-operated properties, other than the partner-operator, was not reported.

[9] General American Oil was the only company which separated wells into unitized and nonunitized wells.

[10] 6 wells were jointly owned with Skelly Oil Co. and 5 with Getty.

Source: Chapman et al., Structure of the U.S. Petroleum Industry, pp. 42-45.

REFERENCES

Annual Reports, Securities and Exchange Commission Form 10-K Reports, and/or Statistical Supplements for 1980 for Amerada Hess Corporation, Ashland Oil Company, Atlantic Richfield Company, British Petroleum Company, Cities Service Company, Compagnie Francaise des Petroles, Conoco, Exxon Corporation (also 1972 Annual Report), Getty Oil Company, Gulf Oil Corporation, Marathon Oil Company, Mobil Corporation, Occidental Petroleum Corporation, Phillips Petroleum Company, Royal Dutch Petroleum Company, Shell Oil Company, Standard Oil Company of California, Standard Oil Company of Indiana, Standard Oil of Ohio, Sun Company, Tenneco, Texaco, Union Oil Company of California.

Blair, John M., The Control of Oil, 1976.

Chapman, Duane, Theresa Flaim, Kathleen Cole, Jan Locken, and Silvio Flaim, The Structure of the U.S. Petroleum Industry: A Summary of Survey Data, U.S. Senate Interior Committee Print, June 1976.

Drucker, Peter F., The Unseen Revolution, 1976.

_____, "The Bored Board," The Wharton Magazine, Fall 1976; Vol. 1, No. 1, pp. 19-25.

Flaim, Theresa, "The Structure of the U.S. Petroleum Industry: Concentration, Vertical Integration, and Joint Activities," Ph.D. dissertation, Cornell University, 1977.

_____, "The Structure of the U.S. Petroleum Industry: Joint Activities and Affiliations," Antitrust Bulletin, Fall 1979; Vol. 24, No. 3, pp. 555-572.

Fortune, May 4, 1981.

Galbraith, John Kenneth, Economics and the Public Purpose, 1973.

Heller, Pauline B., Handbook of Federal Bank Holding Company Law, 1976.

Henn, Harry G., Handbook of the Law of Corporations and Other Business Enterprises, 1961.

Johnson, P.S., and R. Apps, "Interlocking Directorates among the UK's Largest Companies," Antitrust Bulletin, Summer 1979; Vol. 24, No. 2, pp. 357-369.

Knepper, William E., Liability of Corporate Officers and Directors, 3d ed., 1978.

Larner, Robert J., Management Control and the Large Corporation, 1970.

Rothwell, Geoffrey, "Market Coordination by the Urnaium Oxide Industry," Antitrust Bulletin, Spring 1980; pp. 233-268.

Medvin, Norman, The American Oil Industry, 1973.

Salamon, Gerald L, and E. Dan Smith, "Corporate Control and Managerial Misrepresentation of Firm Performance," The Bell Journal of Economics, Spring 1979; Vol. 10, No. 1, pp. 319-328.

Stano, Miron, "Monopoly Power, Ownership Control, and Corporate Performance," The Bell Journal of Economics, Autumn 1976; Vol. 7, No. 2, pp. 672-679.

Tarbell, Ida M., The History of the Standard Oil Company, 2 Vols., 1907.

U.S. House of Representatives, Committee on the Judiciary, The Antitrust Laws: A Basis for Economic Freedom, A Staff Report to the Antitrust Subcommittee, 1965.

U.S. Senate Committee on Governmental Affairs, Structure of Corporate Concentration, Committee Print, December 1980, Vol. 1.