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OIL INDUSTRY PROFITS

Shyam Sunder

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LIST OF PRINTING ERRORS AND CORRECTIONS IN
<u>OIL INDUSTRY PROFITS</u> BY SHYAM SUNDER

1. Page facing the Table of Contents: replace the word "assistant" by "associate."

2. Back cover: replace the word "assistant" by "associate."

3. Table 1, pp. 11-13: under column headed "Statistic," the word "equity" should be replaced by "equally."

4. In the note to Table 1 on p. 13, the first use of the term "equity" should be replaced by "equally." In other places, the word "equity" should remain unchanged.

5. Repeat correction 3 ("equity" to "equally") for Tables 2, 3, 4, 5, 6, and 7.

6. Page 16, line 12: change "equally" to "value."

7. Page 52, line 5: insert "return" after "equilibrium."

8. Page 53, line 16: change "equation (8)" to "equation (7)."

CONTENTS

INTRODUCTION

In my forty years on the Board of Directors, I have never seen excess profits.

—*Cartoon in the* New Yorker

If we are going to do the job, even these [1973] prices and profits fall short.

—*Rawleigh Warner, chairman,*
Mobil Corporation

Those guys are like horses that don't know how to stop when the race is over.

—*Lee C. White, chairman,*
Federal Power Commission

This study of the profitability of the oil industry was prompted by the revelation that the industry had earned record profits in 1973. The oil companies announced their earnings in early 1974, just when the effects of the oil shortage were being felt most acutely by consumers. Throughout the oil crisis of the winter of 1973-1974, a large section of public opinion blamed the oil industry for the crisis. The critics held that the crisis had been engineered by the industry in order to obtain higher prices for their products and increased income for their shareholders. Substantially increased reported income, following on the heels of the oil shortage and price increases, was considered by many to support the theory of an industry-engineered oil crisis. To many critics of the oil industry little further proof was needed that the oil industry was out to loot the consumer and was

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being extraordinarily successful. At best, the crisis was a source of windfall gains to the oil industry; at worst it was a dark conspiracy against the consumer.

The spokesmen and supporters of the oil industry, on the other hand, pointed out that the industry's earnings, though large in absolute terms, were not large in relation to the capital invested and therefore did not represent an abnormally high rate of return. Increases in 1973 earnings over 1972 looked impressive only because the 1972 earnings themselves were unusually low. They added that, since the oil industry must compete in the market for large amounts of capital needed for its expansion, a sufficiently high rate of return on investment was necessary if the nation's demand for oil was to be met in the future. Without conceding the existence of any windfall gains, industry proponents have argued that allowing an adequate level of profitability is necessary to attract further investment so as to solve the long-term energy problem. In short, "Do they want an oil industry that is profitable enough to do the job, or not?" asked J. K. Jamieson, chairman of the Exxon Corporation.

There are, of course, other points of view which lie between these two extremes. The basic issue involved is the profitability—realized in the past and expected in the future—of the oil industry. The current controversy indicates that even past performance is not as easy to measure as it might first appear. Estimating future profitability presents even greater difficulties.

This study is limited to measurement of past performance. In public discussions of the financial performance of the oil industry, the term *windfall gains* has often been used with a vague but socially pejorative connotation to refer to several distinct measures of profitability. The economic concept of windfall gains involves the notion of unexpected and unusual profits (similar losses may occur also). In order to measure the *unexpected* or *unusual* performance, *expected* and *usual* must be defined first. To define such norms of performance, some explicit assumptions about the economic system are necessary. In the first section we briefly discuss these assumptions, as well as the economic concepts of normal and abnormal profits and the difficulties of making these concepts work. Sections 2 and 3 discuss accounting and market-based measures of profitability, problems of measurement, and estimates and their interpretation. The conclusions of the study are presented in Section 4.

1

COST OF CAPITAL AND FAIR RETURNS

Competitive Markets

According to the theory of competitive markets, under an ideal set of conditions, the long-run profitability of business firms is market-regulated and restricted to socially optimum levels. Under such conditions, a strong case can be made for the efficiency of unregulated markets. Whether a particular firm or industry is earning windfall profits is not an important question, because the competitive market mechanism automatically ensures an appropriate adjustment to reallocate resources and prevent such profits from persisting. When the requisite conditions do not obtain—for example, in the presence of monopoly power—a case is made for regulatory intervention to eliminate monopoly profits or losses. Other conditions under which competitive markets do not ensure an optimal solution are the presence of externalities and special goals which are in conflict with the competitive solution.

Whether the petroleum industry has monopolistic power, and whether it behaves like a cartel, has long been a matter of dispute. In a natural monopoly, such as gas or electric utilities average costs decrease with scale of operation and the most efficient use of resources is achieved by a single producer so that regulation becomes desirable to avoid inefficient monopolistic practices.[1] The petroleum industry is not a natural monopoly. However, a case for regulation of the oil industry can be—and has been—made on the basis of externalities and special goals.

[1] That natural monopoly will result in monopoly pricing and profits has been disputed by Harold Demsetz, "Why Regulate Utilities?" *Journal of Law and Economics*, vol. 11 (April 1968), reprinted in Yale Brozen, ed., *The Competitive Economy* (Morristown, N.J.: General Learning Press, 1975).

The United States oil market is only a part of the world oil market. As a producer and consumer of oil, the United States has its own international political and strategic objectives which are affected by conditions in the oil markets. Within the United States, it may be socially, economically, or politically acceptable to change substantially the structure of the oil industry. Over the past decades, therefore, the oil industry has been "regulated" by the government through special tax legislation—percentage depletion allowances, foreign tax credits, and immediate deductions for intangible drilling costs—and protection from foreign competition through import quotas. Arguments in favor of import quotas, for example, stress the strategic importance of a sufficiently high degree of self-reliance in this vital commodity. Continuing or reinstituting percentage depletion allowances for oil has been justified on the grounds that it would encourage exploration for oil and gas and that this goal is socially desirable whether or not it is economically desirable.

In the presence of these special goals, the government may control the environment of the oil industry, as it has in the recent past and continues to do through the Federal Energy Agency, to achieve various social, political, and economic objectives. An important controllable aspect of the environment, at least in the short run, is the profitability of the industry. Reliable and objective measures of profitability, appropriately interpreted, can play a useful role in the process. In this study we do not presume to recommend specific levels of profitability to achieve various goals. Instead, we confine ourselves to measuring and interpreting the profitability of the industry during the past fifteen years.

An underlying assumption of the analysis is that the individual and corporate investors, motivated by the desire for economic gain, will invest or disinvest in an industry depending on its environment—on the one hand the prospects of return; on the other the risk involved. If the objective of public policy is to ensure a certain level of investment in the industry by private persons and corporations, the success of the policy depends on creating the right environment. If the environment is too attractive, too much capital—from society's point of view—will be attracted to the industry; if it is not sufficiently attractive, not enough capital will be invested. As long as various industries compete for private funds in the capital markets on the basis of their attractiveness, this seems to be the only way of ensuring the desirable level of private investment through the instrument of public policy. This assumption about economic behavior is made throughout this study.

Equilibrium and Fair Returns

In order to define windfall gains, we need to define normal, or fair, returns. Economics provides guidelines for a meaningful definition of *normal* or *equilibrium* returns; law provides guidelines for *fair* returns.

Under conditions of certainty and perfect capital markets, all firms earn the same rate of return on investment. This market-wide rate of return is free of risk and reflects the equilibrium between time-dated income streams and consumption preferences of the investors in the capital market. Since the perfect-market assumption includes equal and cost-free distribution of all information, there can be no surprises, and no firm can gain a technological advantage over others. Therefore, under such conditions, no windfall gains can exist. The cost of capital is the same for all firms.

Under conditions of uncertainty and perfect markets, the equilibrium expected return on investment in each firm is just sufficient to compensate the investors for the resources they provide to the firm and the risk they have to bear. Therefore, the equilibrium return to investors in different business enterprises is different. If the risk associated with the business is high, a higher expected return will have to be offered to risk-averse investors in order to induce them to part with their capital; if it is less risky, lower expected returns will suffice.[2]

Windfall Profits. Unexpected developments in the business environment will result in deviations from equilibrium returns. In general the equilibrium returns may rarely be realized because of continual adjustments in the market in response to the myriad daily new developments. Deviations from the equilibrium level of returns—windfall returns—can be interpreted as a consequence of unexpected developments which may be either positive or negative.

In the presence of uncertainty, disequilibrium returns may occur but may not persist in competitive markets. Such returns, caused by unexpected changes in the business environment—for example, technological developments and factor-cost changes are eliminated in the long run through the competitive market mechanism.[3] If returns

[2] Several definitions of risk can be used. In the context of capital asset pricing theory, only the undiversifiable component of risk is compensated by higher equilibrium returns; the diversifiable risk is not.
[3] George J. Stigler, *Capital and Rates of Return in Manufacturing Industries* (Princeton: Princeton University Press for the National Bureau of Economic Research, 1963).

are too high, more firms will be attracted to invest in the business and the competitive pressure will eliminate the excess returns. If returns are too low, some firms will leave the business, thereby reducing the supply and competitive pressure and raising the returns.

The Supreme Court decision in the *Federal Power Commission* v. *Hope Natural Gas Company* is often quoted as the legal standard for *fair* returns on investment:

> The return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital.[4]

Thus the legal definition of fair returns recognizes a standard of comparability of returns. It also recognizes a relationship between risk and return and the necessity of adjusting the fair return standard for differences among the risk of individual firms or industries.

A third aspect of the fair return standard emphasized in this definition is the need for each industry to compete in the capital market for funds. A firm can attract sufficient capital only if it promises to pay sufficiently high returns to the contributors of capital. The legal definition recognizes a link between a socially desirable level of investment in an industry and the establishment of a standard of fair return by the instruments of public policy.

Measurement of Returns

Equilibrium Return and Fair Return. The economic definition of equilibrium return and the legal definition of fair return are easy to understand and widely accepted. They also overlap to a substantial degree and henceforth we shall use the term *normal return* to refer to them both. Obtaining operational measures of normal returns, however, is another matter. Many such measures have been proposed and used in practice, with very different results. The reason, of course, is that the economic and legal definitions of normal return are not sufficiently specific for operational measurement. How do we make the concept of normal returns operational?

From an investor's point of view, return is the ratio of the economic benefits, received in excess of investment over an interval of time, to the investment or economic sacrifice made. The numerator of this ratio (periodic economic benefit) is a flow quantity while the

[4] Federal Power Commission, et al. v. Hope Natural Gas Company, 320 U.S. 591 (1949), p. 603.

denominator (sacrifice) is a stock quantity. The greater the benefit for a given level of sacrifice, the better off the investor. From the point of view of the firm, the return to the investor is the cost of obtaining capital for its operations. The numerator of the ratio, the benefit to the investor, is the share of the output of the firm which is given to the investor in exchange for the capital; the denominator is the input to the firm by the investor and represents the share of the firm's economic resources contributed by the investor.[5] Thus, the return to investor appears as the ratio of benefits to sacrifices from outside and as the cost of capital, or ratio-of-outputs-to-inputs in economic exchanges with the investor from inside the firm. We refer to these two factors of return as *outputs* and *inputs* in the following sections.

Two Approaches to Measurement. There are two major sources of variation in operationalizing the measurement of return. First is the set of investors to whom a definition of return applies. A firm is involved in economic exchanges with a heterogeneous set of economic agents who contribute various forms of input to the firm and receive, in different forms, their share of the firm's output. The rate of return to investors in the firm can be examined from the perspective of different sets of economic agents such as the common equity owners, all equity owners, creditors, and lessors of plant and equipment. Estimates of returns obtained for each set of investors are different, and so are the standards of fair return to compare these returns with. Though the *Hope* decision refers specifically to a standard of fair return for equity owners only, we shall analyze returns to several sets of investors which include the common and preference equity holders as well as the long-term creditors.

The second source of variation in estimates of returns is the measure of input and output used in computing the rate of return. Accounting statements are one source of estimates of inputs and outputs of firms with respect to various investors, and the market prices of securities provide another. The results obtained from the two are often substantially different. In the next two sections of the paper we examine the accounting and market-based measures of returns for the oil industry and compare them with the normal returns for each system of measurement.

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[5] Market value of stock as well as accounting net worth can be viewed as contributed capital. While the latter is recognized as contributed capital as a matter of historical fact, the former is contributed in the opportunity sense because the firm can, on the margin, issue additional capital or retire its stock at a price close to the prevailing market price.

2
ACCOUNTING MEASURES OF PROFIT

Accounting is a measurement system internal to individual firms. The financial statements produced by the accounting system provide the most commonly used estimates of returns. From the common stockholders' point of view, for example, the common equity in the balance sheet of the firm provides a measure of resources supplied by the equity owners to the firm (input). Periodic net income available to the common shareholders is a measure of output of the firm to this group of investors. Therefore, the ratio of net income available for common (I) and net worth (E) is an estimate of return (R_{CE}) to common shareholders.[6]

$$R_{CE} = \frac{I}{E}. \tag{1}$$

R_{CE} is called the *book rate of return.* The traditional interpretation of the fair return standard has been the book rate of return on other business enterprises having comparable risks.[7] There are several difficulties in using the book rate of return for the purpose of standard comparison. We shall return to these after analyzing the performance of the oil industry by the book return standard and other accounting-based standards of comparison.

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[6] The numerator is a flow quantity measured over an interval of time; the denominator is a stock quantity measured at an instant and may, therefore, require adjustment for any capital transactions between the time and the equity holders during the interval.

[7] See H. Leventhal, "Vitality of the Comparable Earnings Standard for Regulation of Utilities in a Growth Economy," *Yale Law Journal*, vol. 74, no. 6 (May 1965), pp. 989-1010; and Steward C. Myers, "The Application of Finance Theory to Public Utility Rate Cases," *The Bell Journal of Economics and Management Science*, vol. 3, no. 1 (Spring 1972), pp. 58-97.

Accounting Data. The data for the following estimates have been obtained from the November 1976 and earlier editions of COMPUSTAT Industrial (Tertiary) magnetic tape files. These files include the financial statements of industrial corporations of the United States in a standardized format. For exact definitions of variables used in the standardization process, the reader may refer to the *COMPUSTAT MANUAL*.[8] A list of firms whose data were analyzed is given in the Appendix.

Return on Common Shareholders' Equity

The net worth of a firm is the accounting measure of shareowners' input of economic resources to the firm. Net income available to the common shareowners is a corresponding measure of output. The ratio of income to net worth (book return) was computed for each oil firm on the COMPUSTAT file. Similar ratios were also computed for all other industrial firms. Summary statistics of these ratios are given in Table 1.

Classification of Oil Firms. The oil industry has been subdivided into four four-digit classes on the basis of the COMPUSTAT file.[9] Crude oil and gas producers (industry code 1311) constitute the first class. The companies whose *primary* business is refining and distributing petroleum products (industry code 291) have been subdivided into three classes. Code 2913 indicates international integrated companies, code 2912 indicates domestic integrated companies, and code 2911 includes all other refiners.

The first four columns of Table 1 give summary statistics for each of the four classes of oil firms mentioned above. The fifth and sixth columns give the summary statistics for refining and integrated firms (code 291) and for all oil firms, respectively. The same statistics for all other industrial firms on the COMPUSTAT file are presented in the last column. Industrial firms include the standard industry classification of mining, construction and manufacturing. In addi-

[8] COMPUSTAT data files and related documentation is published by Investors Management Services, Inc., Denver, Colorado.

[9] Industry classifications given in COMPUSTAT were checked against Securities and Exchange Commission classifications as published in *The Directory of Companies Required to File Annual Reports with the Securities and Exchange Commission under the Securities Exchange Act of 1934*, June 30, 1976. In case of conflict between the two schemes of classification, the description of the company in *Moody's Industrial Manual* was checked. In most cases, the Securities and Exchange Commission classification prevailed.

Table 1

RETURN ON COMMON EQUITY, OIL INDUSTRY, 1961-1975[a]

Year	Statistic	Standard Industrial Classification Code: Crude Oil & Gas 1311	Refining 2911	Integrated Domestic 2912	Integrated International 2913	Refining & Integrated 291	All Petroleum 1311 & 291	Other Mining & Manufacturing 1000-3999 less 1311 & 291
1961	Equity Weighted Average	8.4	9.5	8.4	10.4	9.1	8.8	7.2
	Sample Size	31	11	24	9	44	75	1253
	Standard Deviation	12.5	10.1	7.6	2.3	7.7	10.0	31.0
	Value Weighted Average[b]	16.7	8.4	7.7	10.6	9.6	10.0	9.8
1962	Equity Weighted Average	8.2	9.9	7.7	10.4	8.8	8.5	10.0
	Sample Size	35	13	25	9	47	82	1341
	Standard Deviation	11.2	7.5	6.2	2.2	6.2	8.7	12.1
	Value Weighted Average[b]	16.5	8.7	8.0	10.8	9.9	10.2	11.0
1963	Equity Weighted Average	8.0	10.9	9.6	10.9	10.2	9.2	10.5
	Sample Size	40	13	26	9	48	88	1396
	Standard Deviation	11.0	6.2	5.9	2.5	5.5	8.5	10.2
	Value Weighted Average[b]	16.9	8.4	8.9	11.5	10.6	11.0	11.4
1964	Equity Weighted Average	8.7	11.5	8.9	10.8	10.0	9.4	11.6
	Sample Size	44	13	26	9	48	92	1443
	Standard Deviation	11.5	6.4	6.2	2.4	5.9	9.0	13.4
	Value Weighted Average[b]	15.6	8.5	9.2	11.3	10.6	10.8	12.6
1965	Equity Weighted Average	8.3	14.0	10.3	11.1	11.4	9.9	13.1
	Sample Size	44	12	26	9	47	91	1454
	Standard Deviation	10.2	6.8	6.6	2.2	6.3	8.5	13.4
	Value Weighted Average[b]	15.3	9.7	10.3	11.3	10.9	11.2	13.8

Table 1 (continued)

Year	Statistic	Standard Industrial Classification Code						
		Crude Oil & Gas 1311	Refining 2911	Integrated Domestic 2912	Integrated International 2913	Refining & Integrated 291	All Petroleum 1311 & 291	Other Mining & Manufacturing 1000-3999 less 1311 & 291
1966	Equity Weighted Average	8.6	14.8	12.1	11.2	12.7	10.6	14.3
	Sample Size	46	13	26	9	48	94	1516
	Standard Deviation	10.8	6.8	6.6	2.4	6.2	9.0	12.3
	Value Weighted Average[b]	15.4	10.2	11.4	11.3	11.3	11.6	14.0
1967	Equity Weighted Average	9.6	12.2	12.5	11.6	12.2	10.9	12.9
	Sample Size	46	13	25	9	47	93	1527
	Standard Deviation	12.5	5.1	4.5	4.0	4.6	9.5	14.6
	Value Weighted Average[b]	15.8	9.7	11.7	11.5	11.5	11.8	12.2
1968	Equity Weighted Average	14.1	11.9	12.1	11.5	11.9	13.0	12.4
	Sample Size	49	14	23	9	46	95	1539
	Standard Deviation	38.4	5.4	4.8	4.6	5.0	27.8	19.1
	Value Weighted Average[b]	20.1	9.7	11.7	12.1	11.9	12.3	13.0
1969	Equity Weighted Average	9.2	9.9	10.7	10.7	10.5	9.8	12.0
	Sample Size	52	15	23	9	47	99	1573
	Standard Deviation	13.3	5.8	5.8	5.0	5.7	10.4	19.7
	Value Weighted Average[b]	17.7	8.9	10.7	11.5	11.2	11.5	12.5
1970	Equity Weighted Average	7.1	8.7	10.5	9.5	9.7	8.3	8.5
	Sample Size	54	14	23	9	46	100	1539
	Standard Deviation	10.7	6.5	4.9	3.8	5.3	8.8	22.8
	Value Weighted Average[b]	15.2	8.6	9.6	10.9	10.4	10.7	10.4

1971	Equity Weighted Average	8.1	13.5	8.7	10.3	10.5	9.2	8.0
	Sample Size	57	15	23	9	47	104	1528
	Standard Deviation	17.1	22.7	4.2	3.8	13.4	15.6	22.4
	Value Weighted Average[b]	9.8	10.0	9.2	11.5	10.8	10.7	11.0
1972	Equity Weighted Average	9.0	8.9	9.4	9.3	9.2	9.1	10.5
	Sample Size	55	15	23	9	47	102	1511
	Standard Deviation	13.3	4.7	5.1	3.8	4.8	10.3	38.2
	Value Weighted Average[b]	10.1	10.3	9.2	10.2	9.9	9.9	12.5
1973	Equity Weighted Average	11.0	15.4	23.2	14.8	19.2	14.8	13.3
	Sample Size	54	15	24	9	48	102	1465
	Standard Deviation	7.2	5.6	49.7	2.8	35.5	25.2	17.4
	Value Weighted Average[b]	15.1	15.7	13.0	16.0	15.1	15.1	14.6
1974	Equity Weighted Average	16.8	18.3	20.9	19.4	19.8	18.3	9.6
	Sample Size	54	15	24	9	48	102	1430
	Standard Deviation	12.8	13.9	12.4	4.5	11.9	12.5	31.2
	Value Weighted Average[b]	22.0	18.4	18.4	18.4	18.4	18.6	13.9
1975	Equity Weighted Average	15.9	12.6	12.8	12.7	12.7	14.4	8.3
	Sample Size	51	13	24	8	45	96	1409
	Standard Deviation	8.7	11.4	9.1	3.8	9.2	9.1	31.4
	Value Weighted Average[b]	17.4	14.1	13.6	12.4	12.9	13.1	12.3
1961-1975	Equity Weighted Average	10.2	12.2	11.8	11.7	11.9	11.0	10.8
	Sample Size	712	204	365	134	703	1415	21924
	Standard Deviation	15.6	10.0	15.0	4.3	12.2	14.0	22.3
	Value Weighted Average[b]	15.9	11.3	11.4	12.5	12.1	12.3	12.5

Note: For an explanation of the classification numbers in the column headings, see text, p. 10. The "Statistic" column in Tables 1 through 7 reads "Equity Weighted Average, Sample Size, Standard Deviation, Value Weighted Average."

[a] Income available for common/Common equity.

[b] Σ Available for common/Σ Common equity.

Source: Author.

tion, conglomerates which are classified on COMPUSTAT under code 9997 are included in the group of industrial firms.

The book return was computed for each firm. The equally weighted average of book returns for all firms in industry j in year t is defined as

$$\bar{R}_{CE,j,t} = \frac{1}{N_{jt}} \sum_{i=1}^{N_{jt}} R_{CE,i,t}\,, \tag{2}$$

where $R_{CE,i,t}$ is the book return on firm i in year t, and
N_{jt} is the number of firms in industry class j in year t.
The standard deviation of book returns for industry j in year t is

$$\sigma(R_{CE,j,t}) = \left[\frac{1}{N_{jt}} \sum_{i=1}^{N_{jt}} (R_{CE,i,t} - \bar{R}_{CE,j,t})^2 \right]^{1/2} \tag{3}$$

$\bar{R}_{CE,j,t}$, N_{jt} and $\sigma(R_{CE,j,t})$ for each industry class are given for each of the past fifteen years—1961-1975. In addition, the equity-weighted average of book returns is also given. Equity-weighted average is defined as

$$\bar{R}^{w}_{CE,j,t} = \frac{\sum_{i=1}^{N_{jt}} I_{i,t}}{\sum_{i=1}^{N_{jt}} E_{i,t}}\,, \tag{4}$$

where $I_{i,t}$ = the income available for common for firm i in year t
$E_{i,t}$ = common equity for firm i in year t.

Equally Weighted and Value Weighted Averages. Both equally weighted and value weighted averages have been given because each has some advantage in representing the general tendency of the sample. By its definition, the equally weighted sample is less likely to be affected by deviations in a few large firms. Value weighted averages are greatly affected by deviations of relatively large firms, especially in small samples with high concentration ratios. For large sample sizes, this problem is to a large extent eliminated. Equally weighted averages, on the other hand, are likely to be unduly influenced by large deviations in some small and economically insignificant firms. Such effects also can give misleading results. In the book return, for example, the value of the denominator can be arbitrarily close to zero. A small firm with very small net worth and even moderate profits will show a very large book return which can be several orders of magnitude higher than the ordinary range

Equally weighted averages are strongly affected by such cases, but the value weighted averages are not, because the weight given to a firm with small net worth is also small. For this reason, we provide both equally weighted and value weighted averages throughout this study and let the reader make his own judgment about the central tendency of the samples. In order to avoid extraordinary distortion of equally weighted ratios, we have arbitrarily excluded from the sample corporations whose common equity was less than $1,000,000.

Negative Numbers. Another problem which often arises in ratio analysis is that of negative numbers. When an output measure (such as income) is divided by an input measure (common equity) to obtain a rate of return, the quotient has a meaning only under a presumption of a direct positive relationship between the output and the input. When, in a given period, income is negative, the quotient also is negative. A single occurrence of negative rate of return can only be viewed as a random event and not as an equilibrium rate. To interpret a negative rate of return as an equilibrium rate implies smaller outputs for greater inputs which contradicts the assumption that lies behind the rate-of-return analysis. A positive rate of return, on the other hand, can be viewed both as a random realization and as an equilibrium value. Cross-sectional averaging of both the positive and the negative occurrences provides an estimate of the equilibrium value and is therefore acceptable.

There are two other cases where interpretation of returns is not obvious. First is a negative rate of return arising out of a negative input measure (such as common equity). Negative common equity is unusual but not unknown. If the accounting measure of input is negative, no economic meaning can be attached to the output. Therefore, it might be justifiable to drop such cases from the analysis. If common equity is the true measure of the net worth of the firms, firms with negative common equity will be insolvent and cannot continue to operate; so it can be argued that whenever such a case occurs, the reason is the inability of accounting procedures to estimate the net worth of the company correctly. This, however, is not to say that the positive common equity is always the correct measure of net worth. In any case, the exclusion of firms which show a negative input measure to yield a negative rate of return seems justified.

The preceding remarks also apply to the cases where a positive rate of return results from dividing a negative output measure by a negative input measure. If firms with less than $1,000,000 common equity are excluded from the sample, such occurrences are also eliminated.

We can now return to Table 1 which shows the average book returns for oil and other industrial firms for each of the past fifteen years. Fifteen-year averages are given at the bottom of the table. During this period, the equally weighted average book return for the oil industry, 11.0 percent, is practically indistinguishable from the return on other industrial firms, 10.8 percent. The same is true for equally weighted averages (12.3 and 12.5 percent, respectively). For subgroups within the oil industry, the equally weighted return for the crude oil firms is the lowest; the value weighted return for the same subgroup is highest of all. All other subgroup returns are very close to the group averages. Both the equally and value weighted returns were higher than the average returns for only one of the four subgroups in the oil industry—the international integrated firms.

For eight of the fifteen years under study, the book returns on the oil industry were lower than the book returns for other industries; 1964-1967 and 1972 were the worst years for the industry, 1973-1975 were the best. The cumulative performance of the oil industry until 1972 was clearly inferior to the performance of other industries, and the better returns during 1973-1975 brought the cumulative performance almost to the level of the other industries. If the average performance of all other industrial firms is taken as the normal return, the oil industry does not seem to have made large profits during the past fifteen years.

Return on Owners' Equity

A broader definition of investors would include the holders of preferred equity in addition to the common equity holders. The accounting measure of their input to the firm is the owners' equity on the balance sheet. The accounting measure of the total output of the firm available to this set of investors is the net income. Therefore, an all-inclusive measure of profitability of the firm from the point of view of all its equity holders is the ratio of net income to owners' equity.

Equally weighted and value weighted averages of return on owners' equity for the seven industry groups are shown in Table 2. As explained earlier, firms with less than $1 million in owners' equity

Table 2

RETURN ON OWNERS' EQUITY, OIL INDUSTRY, 1961-1975[a]

Year	Statistic	Standard Industrial Classification Code: Crude Oil & Gas 1311	Refining 2911	Integrated Domestic 2912	Integrated International 2913	Refining & Integrated 291	All Petroleum 1311 & 291	Other Mining & Manufacturing 1000-3999 less 1311 & 291
1961	Equity Weighted Average	8.4	9.7	9.5	10.0	9.7	9.1	8.0
	Sample Size	31	11	25	9	45	76	1262
	Standard Deviation	12.4	9.9	9.7	2.2	8.8	10.4	18.8
	Value Weighted Average[b]	16.7	8.4	7.6	10.5	9.5	9.9	9.6
1962	Equity Weighted Average	8.1	10.0	8.7	10.1	9.3	8.8	9.8
	Sample Size	35	13	26	9	48	83	1346
	Standard Deviation	11.1	7.4	7.9	2.2	7.1	9.0	10.7
	Value Weighted Average[b]	16.4	8.7	7.9	10.7	9.8	10.1	10.7
1963	Equity Weighted Average	8.1	10.9	9.2	10.6	9.9	9.1	10.1
	Sample Size	40	13	26	9	48	88	1404
	Standard Deviation	10.9	6.2	5.3	2.5	5.3	8.4	10.0
	Value Weighted Average[b]	16.9	8.4	8.7	11.4	10.5	10.8	11.1
1964	Equity Weighted Average	8.8	11.0	8.6	10.5	9.6	9.2	10.9
	Sample Size	44	13	26	9	48	92	1449
	Standard Deviation	11.5	6.2	5.8	2.3	5.6	8.9	12.3
	Value Weighted Average[b]	15.6	8.5	9.0	11.2	10.4	10.7	12.3
1965	Equity Weighted Average	8.0	13.1	9.8	10.8	10.8	9.4	12.8
	Sample Size	44	12	26	9	47	91	1465
	Standard Deviation	9.7	6.4	6.2	2.1	5.9	8.1	13.1
	Value Weighted Average[b]	15.2	9.6	9.9	11.2	10.7	11.0	13.5

Table 2 (continued)

Year	Statistic	Standard Industrial Classification Code						
		Crude Oil & Gas 1311	Refining 2911	Integrated Domestic 2912	Integrated International 2913	Refining & Integrated 291	All Petroleum 1311 & 291	Other Mining & Manufacturing 1000-3999 less 1311 & 291
1966	Equity Weighted Average	8.2	13.3	11.0	10.9	11.6	9.9	13.7
	Sample Size	46	13	26	9	48	94	1524
	Standard Deviation	10.5	6.7	5.9	2.3	5.8	8.6	11.1
	Value Weighted Average[b]	15.2	10.2	10.6	11.3	11.0	11.3	13.6
1967	Equity Weighted Average	8.9	11.7	11.5	10.6	11.4	10.2	12.1
	Sample Size	46	13	25	9	47	93	1540
	Standard Deviation	12.1	5.1	3.8	2.7	4.1	9.1	14.9
	Value Weighted Average[b]	14.9	9.6	10.9	11.4	11.2	11.4	11.8
1968	Equity Weighted Average	9.2	11.3	11.4	10.6	11.2	10.2	11.1
	Sample Size	50	14	24	9	47	97	1552
	Standard Deviation	10.7	5.4	4.3	3.5	4.5	8.3	27.2
	Value Weighted Average[b]	16.7	9.7	10.9	12.0	11.6	11.9	12.4
1969	Equity Weighted Average	8.5	9.5	10.4	9.9	10.0	9.2	11.0
	Sample Size	53	15	24	9	48	101	1590
	Standard Deviation	11.1	5.7	6.0	3.9	5.6	8.9	17.9
	Value Weighted Average[b]	15.5	8.8	9.8	11.4	10.8	11.1	11.9
1970	Equity Weighted Average	6.9	9.7	10.4	9.2	9.9	8.3	7.9
	Sample Size	55	15	24	9	48	103	1558
	Standard Deviation	9.9	7.3	5.7	3.6	6.0	8.4	19.7
	Value Weighted Average[b]	13.6	8.5	9.1	10.8	10.1	10.3	9.9

1971	Equity Weighted Average	8.1	8.8	8.8	9.9	9.0	8.5	7.4
	Sample Size	58	15	24	9	48	106	1547
	Standard Deviation	12.0	6.8	4.8	3.5	5.3	9.6	21.6
	Value Weighted Average[b]	9.2	9.7	8.8	11.4	10.5	10.4	10.5
1972	Equity Weighted Average	7.8	8.6	8.9	8.9	8.8	8.3	10.5
	Sample Size	55	15	24	9	48	103	1527
	Standard Deviation	7.9	4.5	4.2	3.3	4.2	6.4	15.0
	Value Weighted Average[b]	9.3	10.1	8.4	10.2	9.6	9.6	12.1
1973	Equity Weighted Average	10.7	14.4	12.7	14.4	13.5	12.1	12.4
	Sample Size	54	15	24	9	48	102	1479
	Standard Deviation	6.9	5.2	7.0	2.9	5.9	6.6	18.7
	Value Weighted Average[b]	13.8	15.3	11.6	15.9	14.5	14.4	14.1
1974	Equity Weighted Average	16.1	17.5	17.5	19.1	17.8	16.9	9.4
	Sample Size	54	15	24	9	48	102	1440
	Standard Deviation	11.7	13.1	4.4	4.6	8.2	10.2	25.6
	Value Weighted Average[b]	20.0	18.1	16.7	18.3	17.7	17.8	13.5
1975	Equity Weighted Average	15.6	12.5	11.4	12.5	11.9	13.8	8.3
	Sample Size	51	13	54	8	45	96	1421
	Standard Deviation	8.6	10.7	7.0	3.6	7.9	8.5	30.7
	Value Weighted Average[b]	15.9	13.7	12.5	12.4	12.5	12.7	12.0
1961-1975	Equity Weighted Average	9.6	11.5	10.7	11.2	11.0	10.3	10.4
	Sample Size	716	205	402	134	711	1427	22104
	Standard Deviation	10.9	7.8	6.5	4.0	6.5	9.0	19.0
	Value Weighted Average[b]	14.8	11.1	10.7	12.4	11.8	11.9	12.0

Note: For an explanation of the classification numbers in the column headings, see text p. 10.
[a] Net income/(Common + Preferred equity).
[b] Σ Net income/Σ (Common + Preferred equity).
Source: Author.

have been excluded from the sample. For the fifteen-year period, the equally weighted average return for the oil industry (10.3 percent) is slightly less than the return on other mining and manufacturing firms (10.4 percent); the value weighted return (11.9 percent) is also slightly less than the corresponding return for other firms (12 percent). Except in the case of value weighted returns for the crude oil firms, the average returns for the subgroups within the oil industry are very close to these broad averages. Both the equally and value weighted returns were higher than the averages for the international integrated firms.

For the industry as a whole, the returns were relatively high in 1974-1975 and low in 1964-1966 and 1972. This pattern generally holds across the industry subgroups. The cumulative performance of the industry until 1973 was worse than average; the high returns in 1974-1975 barely enabled the industry to catch up.

Return on Employed Capital

A broader definition of investors includes the long-term creditors of a firm. Claims of such investors have priority over the claims of the equity holders, but their share of the output of the firm is fixed in nominal terms. To the extent that the ability of a firm to fulfill its obligations to its long-term creditors depends on its financial health, these investors also share a part of the risk of the firm and are investors in its operations. The input of this broader set of investors to the firm is measured in accounting by owners' equity plus the book value of the long-term debt,[10] the sum referred to as the *employed capital.* The output of the firm to this set of investors is obtained by adding the net income and interest expense on the long-term debt.[11] The ratio of output to input is called the *return on employed*

[10] The book value, in general, differs from the current market value of the debt.

[11] A refinement frequently used in measuring the total return to the equity and bond holders of a firm is to adjust the interest payment for the tax effect. This adjustment is made by multiplying the interest payments by (1 — marginal tax rate) of the firm. The justification is that the adjusted figure is more useful in evaluating the efficiency with which the management has operated the assets entrusted to them by the owners. The tax advantage accruing to the firm through issue of debt is attributed to the financing decisions taken and therefore excluded from the measure of operating efficiency.

In this study we do not make such an adjustment. The adjusted figures are quite appropriate to the extent that the purpose of the measure is to examine the *capital.* Equally weighted and value (employed capital) weighted averages of return on employed capital for the seven industry groups and fifteen years are given in Table 3.

For the fifteen-year period the equally weighted average return on capital employed for the oil industry was 1 percentage point lower than the average return of 10.1 percent for other industries. The value weighted return was even at 10.7 percent. This measure of return exhibits the same pattern as the two previous measures—the oil industry played catch-up after realizing lower than average returns throughout the sixties—except that in this case, the industry did not quite catch up.

Return on Assets

A still broader definition of inputs to a firm is the total assets (or equities) of the firms. This accounting concept measures all the economic resources being used by the firm.[12] Besides the owners' equity and the long-term debt, this measure includes the current liabilities which represent the input of short-term creditors of the firm to its capital. If the same output measure—net income plus interest—is used, the ratio of output to input results in the return on assets. Table 4 summarizes the returns on assets for the various industry groups.

The fifteen-year average return on assets for the oil industry was 7.1 percent, 0.2 percent lower than the return for other industries. The value weighted average return for the oil industry was 0.3 percent higher at 8 percent. On the whole, the fifteen-year performance of the oil industry is about even with those of the other industries.

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operating efficiency. Our purpose, however, is to assess the overall performance of the entire industry and not its operating performance (narrowly defined) alone. Overall performance includes the effect of the financing decisions as well as the effect of the existing tax structure on returns to the owners of the firm. Exclusion of the tax effects, in such a case, would defeat our purpose.

The effect of not making the tax adjustment is to leave open the possibility that the interindustry differences in returns are due to differences in risk borne by the equity holders arising out of capital structure. The accounting measures do not adjust for differences in returns due either to operating or financing risk. Risk-adjusted measures of returns derived from the stock market are presented in the next section.

[12] It is easy to point out important economic resources utilized by a firm (for example, human capital) which do not appear as assets under currently used accounting procedures. The concept, however, does not exclude such resources, and there are signs that the accounting *practice* is moving closer to the concept.

Table 3

RETURN ON EMPLOYED CAPITAL, OIL INDUSTRY, 1961-1975[a]

Year	Statistic	Crude Oil & Gas 1311	Refining 2911	Integrated Domestic 2912	Integrated International 2913	Refining & Integrated 291	All Petroleum 1311 & 291	Other Mining & Manufacturing 1000-3999 less 1311 & 291
		Standard Industrial Classification Code						
1961	Equity Weighted Average	9.4	7.9	6.8	8.8	7.5	8.3	8.3
	Sample Size	30	10	24	9	43	73	1113
	Standard Deviation	10.2	5.8	3.4	2.3	4.0	7.3	12.1
	Value Weighted Average[b]	15.7	7.7	6.9	9.4	8.5	8.9	8.9
1962	Equity Weighted Average	8.9	7.3	6.5	9.1	7.2	8.0	9.3
	Sample Size	35	11	26	9	46	81	1202
	Standard Deviation	9.1	3.9	3.9	2.3	3.8	6.7	8.8
	Value Weighted Average[b]	15.2	7.2	7.2	9.7	8.8	9.2	9.7
1963	Equity Weighted Average	5.7	8.9	7.9	9.5	8.5	7.2	9.5
	Sample Size	42	12	26	9	47	89	1241
	Standard Deviation	15.9	4.4	2.4	2.6	3.1	11.3	8.6
	Value Weighted Average[b]	15.3	7.5	7.9	10.3	9.4	9.8	10.0
1964	Equity Weighted Average	8.0	9.4	8.3	9.4	8.8	8.4	10.4
	Sample Size	43	12	26	9	47	90	1304
	Standard Deviation	8.9	4.5	3.3	2.3	3.5	6.7	8.3
	Value Weighted Average[b]	13.9	8.0	8.2	10.2	9.4	9.7	10.9
1965	Equity Weighted Average	8.0	10.9	8.6	9.7	9.4	8.7	11.4
	Sample Size	41	12	26	9	47	88	1361
	Standard Deviation	7.6	5.0	3.7	2.2	4.0	6.0	9.0
	Value Weighted Average[b]	13.2	8.7	8.7	10.1	9.6	9.8	11.7

1966	Equity Weighted Average	8.0	11.5	9.4	9.7	10.0	9.0	12.3
	Sample Size	45	13	26	9	48	93	1420
	Standard Deviation	7.6	5.8	3.9	2.1	4.3	6.2	8.7
	Value Weighted Average[b]	12.7	9.2	9.1	10.1	9.7	9.9	11.6
1967	Equity Weighted Average	7.8	9.9	9.6	9.4	9.7	8.7	11.0
	Sample Size	45	13	25	9	47	92	1459
	Standard Deviation	7.1	3.5	2.3	2.3	2.7	5.4	8.9
	Value Weighted Average[b]	12.9	8.7	9.4	10.1	9.8	10.0	10.1
1968	Equity Weighted Average	9.3	9.9	9.5	9.3	9.6	9.5	10.4
	Sample Size	47	14	24	9	47	94	1500
	Standard Deviation	9.1	4.2	2.8	2.8	3.3	6.8	9.4
	Value Weighted Average[b]	13.6	8.8	9.3	10.5	10.1	10.3	10.6
1969	Equity Weighted Average	7.6	8.3	8.7	8.8	8.6	8.1	9.8
	Sample Size	51	15	24	9	48	99	1550
	Standard Deviation	8.4	3.7	3.9	3.2	3.7	6.6	9.3
	Value Weighted Average[b]	12.7	8.0	8.9	10.2	9.7	9.9	10.1
1970	Equity Weighted Average	6.6	7.2	8.6	8.4	8.2	7.3	8.5
	Sample Size	54	14	24	9	47	101	1538
	Standard Deviation	7.5	4.0	3.1	3.1	3.5	6.0	9.7
	Value Weighted Average[b]	11.4	7.9	8.3	9.8	9.2	9.3	9.2
1971	Equity Weighted Average	8.2	7.2	7.9	9.0	7.9	8.0	8.3
	Sample Size	56	14	24	9	47	103	1536
	Standard Deviation	8.1	4.4	2.7	2.9	3.4	6.4	8.7
	Value Weighted Average[b]	8.8	9.0	8.1	10.3	9.5	9.5	9.5
1972	Equity Weighted Average	7.0	8.5	7.9	8.6	8.2	7.6	9.6
	Sample Size	55	14	24	9	47	102	1517
	Standard Deviation	4.9	3.9	2.0	2.6	2.8	4.1	7.4
	Value Weighted Average[b]	8.4	9.1	7.8	9.5	8.9	8.9	10.4

Table 3 (continued)

Year	Statistic	Standard Industrial Classification Code						
		Crude Oil & Gas 1311	Refining 2911	Integrated Domestic 2912	Integrated International 2913	Refining & Integrated 291	All Petroleum 1311 & 291	Other Mining & Manufacturing 1000-3999 less 1311 & 291
1973	Equity Weighted Average	9.8	12.6	10.5	12.7	11.5	10.6	11.2
	Sample Size	54	14	24	9	47	101	1469
	Standard Deviation	4.8	3.7	3.9	3.0	3.8	4.5	7.7
	Value Weighted Average[b]	12.4	13.2	10.3	14.2	12.8	12.8	12.2
1974	Equity Weighted Average	14.0	15.7	14.3	16.6	15.2	14.5	11.2
	Sample Size	54	15	24	9	48	102	1430
	Standard Deviation	7.3	10.0	2.9	3.3	6.2	6.8	8.9
	Value Weighted Average[b]	16.1	15.7	14.0	16.2	15.4	15.5	12.3
1975	Equity Weighted Average	13.4	12.2	10.4	11.2	11.1	12.3	9.9
	Sample Size	51	13	24	8	45	96	1413
	Standard Deviation	5.6	6.3	3.7	2.2	4.5	5.2	10.8
	Value Weighted Average[b]	13.1	12.3	10.8	11.6	11.3	11.4	11.2
1961-1975	Equity Weighted Average	8.9	9.9	9.0	10.0	9.4	9.1	10.1
	Sample Size	703	196	371	134	701	1404	21053
	Standard Deviation	8.6	5.7	3.7	3.4	4.3	6.9	9.2
	Value Weighted Average[b]	12.7	10.1	9.4	11.2	10.6	10.7	10.7

Note: For an explanation of the classification numbers in the column headings, see text, p. 10.
[a] (Net income + Interest)/Employed capital.
[b] Σ (Net income + Interest)/Σ Employed capital.
Source: Author.

Table 4

RETURN ON TOTAL ASSETS, OIL INDUSTRY, 1961-1975[a]

Year	Statistic	Standard Industrial Classification Code						
		Crude Oil & Gas 1311	Refining 2911	Integrated Domestic 2912	Integrated International 2913	Refining & Integrated 291	All Petroleum 1311 & 291	Other Mining & Manufacturing 1000-3999 less 1311 & 291
1961	Equity Weighted Average	7.3	6.5	5.7	7.4	6.3	6.7	6.4
	Sample Size	30	11	24	9	44	74	1167
	Standard Deviation	8.2	4.5	2.7	2.0	3.2	5.8	6.5
	Value Weighted Average[b]	12.6	6.6	5.9	7.7	7.1	7.4	6.9
1962	Equity Weighted Average	7.1	6.2	5.5	7.6	6.1	6.5	6.9
	Sample Size	35	12	26	9	47	82	1249
	Standard Deviation	7.5	3.2	3.3	2.0	3.2	5.5	5.9
	Value Weighted Average[b]	12.4	6.5	6.2	7.8	7.3	7.6	7.4
1963	Equity Weighted Average	5.1	7.1	6.6	7.9	7.0	6.1	6.9
	Sample Size	42	13	26	9	48	90	1288
	Standard Deviation	11.3	3.3	1.9	2.2	2.5	8.0	5.7
	Value Weighted Average[b]	12.7	6.4	6.7	8.3	7.7	8.0	7.6
1964	Equity Weighted Average	5.9	7.6	6.9	7.8	7.3	6.6	7.7
	Sample Size	44	12	26	9	47	91	1310
	Standard Deviation	9.8	3.6	2.7	2.0	2.9	7.2	5.5
	Value Weighted Average[b]	11.8	6.7	6.9	8.2	7.7	8.0	8.3
1965	Equity Weighted Average	6.8	8.5	7.1	8.0	7.6	7.2	8.3
	Sample Size	42	12	26	9	47	89	1367
	Standard Deviation	6.5	3.1	2.8	2.0	2.8	4.9	5.8
	Value Weighted Average[b]	11.2	7.2	7.4	8.1	7.8	8.0	8.7

Table 4 (continued)

Year	Statistic	Standard Industrial Classification Code: Crude Oil & Gas 1311	Refining 2911	Integrated Domestic 2912	Integrated International 2913	Refining & Integrated 291	All Petroleum 1311 & 291	Other Mining & Manufacturing 1000-3999 less 1311 & 291
1966	Equity Weighted Average	6.7	8.9	7.6	8.0	8.0	7.4	8.7
	Sample Size	44	12	25	9	46	90	1373
	Standard Deviation	6.7	4.2	2.9	1.9	3.2	5.2	5.8
	Value Weighted Average[b]	10.6	7.6	7.5	8.0	7.8	8.0	8.6
1967	Equity Weighted Average	6.4	7.8	7.9	7.5	7.8	7.1	8.0
	Sample Size	44	13	23	9	45	89	1441
	Standard Deviation	6.1	2.3	1.9	1.8	2.0	4.5	5.9
	Value Weighted Average[b]	10.4	7.2	7.9	7.8	7.8	7.9	7.5
1968	Equity Weighted Average	7.4	7.6	7.6	7.3	7.5	7.5	7.6
	Sample Size	48	14	24	9	47	95	1496
	Standard Deviation	7.2	2.3	2.2	2.0	2.2	5.3	5.5
	Value Weighted Average[b]	10.9	7.0	7.5	8.0	7.8	8.0	7.7
1969	Equity Weighted Average	6.5	6.6	6.9	6.8	6.8	6.6	7.3
	Sample Size	50	14	24	9	47	97	1503
	Standard Deviation	5.6	2.6	3.0	2.4	2.8	4.5	5.3
	Value Weighted Average[b]	10.1	6.5	7.0	7.7	7.5	7.6	7.3
1970	Equity Weighted Average	5.3	5.6	6.9	6.4	6.4	5.8	6.2
	Sample Size	53	14	24	9	47	100	1504
	Standard Deviation	6.3	3.0	2.5	2.3	2.7	5.0	6.4
	Value Weighted Average[b]	8.9	6.2	6.6	7.3	7.0	7.2	6.6

1971	Equity Weighted Average	5.9	5.4	6.3	6.7	6.1	6.0	6.3
	Sample Size	54	14	24	9	47	101	1488
	Standard Deviation	5.5	3.3	2.1	2.1	2.6	4.4	5.6
	Value Weighted Average[b]	6.5	7.0	6.5	7.6	7.2	7.2	6.9
1972	Equity Weighted Average	5.8	6.4	6.2	6.3	6.3	6.0	7.1
	Sample Size	53	14	24	9	47	100	1467
	Standard Deviation	3.9	2.6	1.7	1.9	2.0	3.2	4.9
	Value Weighted Average[b]	6.3	7.2	6.2	6.8	6.6	6.6	7.5
1973	Equity Weighted Average	7.2	8.8	7.8	8.9	8.3	7.7	7.9
	Sample Size	53	14	24	9	47	100	1429
	Standard Deviation	3.1	2.0	2.8	1.8	2.4	2.8	4.9
	Value Weighted Average[b]	7.7	9.7	7.9	9.7	9.1	9.1	8.5
1974	Equity Weighted Average	10.6	9.7	10.2	10.7	10.1	10.4	7.9
	Sample Size	50	13	24	8	45	95	1413
	Standard Deviation	5.5	6.0	2.3	3.2	3.9	4.8	5.4
	Value Weighted Average[b]	11.6	10.2	10.3	10.0	10.1	10.2	8.4
1975	Equity Weighted Average	10.0	8.1	7.2	7.2	7.4	8.8	7.1
	Sample Size	50	13	24	8	45	95	1415
	Standard Deviation	4.2	4.3	2.6	1.8	3.1	4.0	6.1
	Value Weighted Average[b]	9.2	8.1	7.7	7.1	7.4	7.5	7.8
1961-1975	Equity Weighted Average	7.0	7.3	7.0	7.6	7.3	7.1	7.3
	Sample Size	692	195	368	133	696	1388	20910
	Standard Deviation	6.8	3.6	2.6	2.2	2.8	5.2	5.7
	Value Weighted Average[b]	9.7	7.6	7.5	8.1	7.9	8.0	7.7

Note: For an explanation of the classification numbers in the column headings, see text, p. 10.
[a] (Net income + Interest)/Total assets.
[b] Σ (Net income + Interest)/Σ Total assets.
Source: Author.

Return on Sales

Measures of profitability discussed above are overall measures of return to various classes of investors. Such overall measures can be broken down into component measures which provide further insights into the differences that may exist in the structure of various industries. Two such component measures are the ratios of net income and operating income to the sales volume of the firm. Since the time of sale is the usual signal for recognition of revenue and expense, the fraction of each sales dollar remaining after providing for operating expenses and the fraction available for the equity holders is a useful component of profitability of the industry. Table 5 gives the averages for net income/sales ratios and Table 6 gives the summary statistics for the operating income/sales ratios.

These tables indicate that a much larger fraction of the sales dollar is available to the oil industry as operating income than is the case with other industries. For the international integrated and crude oil firms, average gross margin on sales is about 23 and 40 percent, respectively. The other domestic integrated refiners do not do as well but are still far ahead of other industries.

The relative advantage of the oil industry is also evident in the net income/sales ratios. Oil firms retain a much larger fraction of the sales dollar as net income compared with all other industries, the difference being particularly large for the crude oil and international integrated firms.

Since returns on investment ratios for the oil industry are less than or equal to the returns for the other industries, high income-to-sales ratios imply that sales-to-investment ratios for the oil industry must be relatively low. In other words, the oil industry is capital intensive and greater investment is required to generate a dollar of sales in this industry than is the case on average, with other industries.

The results of analysis of returns on common equity, owners' equity, employed capital, and total assets are summarized in Figures 1 to 6 for various oil industry groups. The *differences* between rates of return on *all oil firms* and other industrial firms are shown in Figure 1. With the exception of two years, 1974 and 1975, the rates of return on the oil industry were relatively low. That the same conclusion holds for most ratios for all subgroups of the oil industry can readily be confirmed. The average return relative to other industrial firms for the fifteen-year period is positive for some subgroups and negative for others, but is uniformly small and relatively insignificant.

Even in 1973, when the record profits of the oil industry became

Table 5

NET MARGIN ON SALES, OIL INDUSTRY, 1961-1975[a]

		Standard Industrial Classification Code						
Year	Statistic	Crude Oil & Gas 1311	Refining 2911	Integrated Domestic 2912	Integrated International 2913	Refining & Integrated 291	All Petroleum 1311 & 291	Other Mining & Manufacturing 1000-3999 less 1311 & 291
1961	Equity Weighted Average	19.7	5.3	8.1	27.1	11.3	14.4	4.6
	Sample Size	26	11	24	9	44	70	1303
	Standard Deviation	18.7	7.9	9.7	46.9	24.1	22.6	7.1
	Value Weighted Average[b]	23.2	7.7	7.1	10.1	9.0	9.6	4.9
1962	Equity Weighted Average	18.9	7.7	7.4	20.8	10.0	13.4	5.0
	Sample Size	29	13	25	9	47	76	1382
	Standard Deviation	19.4	5.0	12.5	29.1	16.7	18.3	6.2
	Value Weighted Average[b]	23.1	8.0	7.3	10.1	9.1	9.6	5.2
1963	Equity Weighted Average	19.2	7.7	9.2	19.6	10.8	14.3	4.9
	Sample Size	34	13	25	9	47	81	1450
	Standard Deviation	18.8	4.1	12.6	24.5	14.9	17.2	7.6
	Value Weighted Average[b]	23.2	7.5	7.8	10.6	9.6	10.1	5.4
1964	Equity Weighted Average	20.0	8.0	8.7	24.6	11.5	15.1	5.4
	Sample Size	36	13	26	9	48	84	1482
	Standard Deviation	18.3	4.2	12.2	38.2	20.0	19.7	7.4
	Value Weighted Average[b]	22.5	7.4	8.1	10.6	9.7	10.1	5.8
1965	Equity Weighted Average	17.6	8.8	9.3	29.6	13.1	15.1	5.9
	Sample Size	39	12	26	9	47	86	1495
	Standard Deviation	18.0	3.5	17.5	52.4	27.6	23.9	7.4
	Value Weighted Average[b]	21.5	7.8	8.7	10.5	9.8	10.2	6.1

Table 5 (continued)

Year	Statistic	Crude Oil & Gas 1311	Refining 2911	Integrated Domestic 2912	Integrated International 2913	Refining & Integrated 291	All Petroleum 1311 & 291	Other Mining & Manufacturing 1000-3999 less 1311 & 291
		Standard Industrial Classification Code						
1966	Equity Weighted Average	18.3	9.1	7.8	31.6	12.6	15.3	5.9
	Sample Size	44	13	26	9	48	92	1566
	Standard Deviation	27.2	4.7	6.8	58.8	27.6	27.6	9.0
	Value Weighted Average[b]	16.7	8.4	8.7	10.4	9.7	10.0	6.0
1967	Equity Weighted Average	17.4	17.8	8.4	31.2	15.4	16.3	5.4
	Sample Size	43	13	25	9	47	90	1572
	Standard Deviation	15.3	36.4	3.6	60.2	33.8	26.6	8.9
	Value Weighted Average[b]	16.9	7.8	8.8	9.9	9.5	9.8	5.2
1968	Equity Weighted Average	19.3	16.2	8.2	17.9	12.4	15.8	5.0
	Sample Size	46	14	24	9	47	93	1588
	Standard Deviation	18.3	33.5	2.7	21.7	21.1	20.1	8.6
	Value Weighted Average[b]	15.2	7.3	8.6	10.1	9.5	9.8	5.3
1969	Equity Weighted Average	20.5	6.6	6.7	7.8	6.9	13.8	4.5
	Sample Size	49	15	24	9	48	97	1619
	Standard Deviation	16.7	4.5	3.5	5.4	4.2	14.0	8.4
	Value Weighted Average[b]	14.2	6.4	7.8	9.4	8.7	9.0	4.9
1970	Equity Weighted Average	8.5	4.1	6.5	8.0	6.0	7.3	3.2
	Sample Size	52	15	24	9	48	100	1584
	Standard Deviation	65.0	6.2	2.7	2.7	4.4	47.0	11.3
	Value Weighted Average[b]	11.8	5.9	6.9	8.6	7.9	8.1	4.2

1971	Equity Weighted Average	15.0	−1.0	5.8	8.7	4.3	10.0	3.4
	Sample Size	55	15	24	9	48	103	1566
	Standard Deviation	20.1	23.7	2.6	2.1	13.9	18.3	7.4
	Value Weighted Average[b]	7.2	6.2	6.4	8.4	7.6	7.6	4.4
1972	Equity Weighted Average	15.7	7.0	5.8	6.8	6.3	11.3	4.4
	Sample Size	55	15	24	9	48	103	1547
	Standard Deviation	17.9	7.7	2.4	2.0	4.8	14.3	5.4
	Value Weighted Average[b]	7.2	6.2	6.0	7.0	6.7	6.7	4.9
1973	Equity Weighted Average	20.2	6.9	7.0	9.4	7.4	14.2	4.9
	Sample Size	54	15	24	9	48	102	1498
	Standard Deviation	13.8	3.8	3.6	1.6	3.5	12.2	6.2
	Value Weighted Average[b]	9.2	8.2	7.5	9.5	8.8	8.8	5.2
1974	Equity Weighted Average	21.6	5.9	7.2	8.8	7.1	14.8	4.1
	Sample Size	54	15	24	9	48	102	1457
	Standard Deviation	16.9	5.2	3.0	6.2	4.6	14.6	6.5
	Value Weighted Average[b]	11.4	6.5	7.5	6.8	7.0	7.1	4.7
1975	Equity Weighted Average	19.5	4.6	4.9	6.5	5.1	12.7	3.7
	Sample Size	51	13	24	8	45	96	1436
	Standard Deviation	10.1	5.4	2.9	5.0	4.2	10.7	6.2
	Value Weighted Average[b]	9.4	4.5	5.6	4.8	5.0	5.2	4.3
1961-1975	Equity Weighted Average	17.9	7.6	7.4	17.3	9.3	13.5	4.6
	Sample Size	667	205	369	134	708	1375	22545
	Standard Deviation	25.2	15.7	8.4	33.6	18.4	22.4	7.8
	Value Weighted Average[b]	12.6	6.7	7.2	8.2	7.8	8.0	5.0

Note: For an explanation of the classification numbers in the column headings, see text, p. 10.
[a] Net income/Net sales.
[b] Σ Net income/Σ Net sales.
Source: Author.

Table 6

GROSS MARGIN ON SALES, OIL INDUSTRY, 1961-1975[a]

Year	Statistic	Crude Oil & Gas 1311	Refining 2911	Integrated Domestic 2912	Integrated International 2913	Refining & Integrated 291	All Petroleum 1311 & 291	Other Mining & Manufacturing 1000-3999 less 1311 & 291
		Standard Industrial Classification Code						
1961	Equity Weighted Average	51.8	21.0	20.7	23.3	21.3	32.6	12.1
	Sample Size	26	11	24	9	44	70	1291
	Standard Deviation	20.9	13.1	11.5	5.5	11.1	21.3	9.4
	Value Weighted Average[b]	52.4	18.4	18.9	20.7	20.0	21.3	13.0
1962	Equity Weighted Average	53.2	21.4	20.1	24.6	21.3	33.5	12.5
	Sample Size	29	13	25	9	47	76	1372
	Standard Deviation	19.8	14.5	10.8	7.9	11.6	21.7	9.6
	Value Weighted Average[b]	52.6	18.7	18.8	20.4	19.9	21.1	13.6
1963	Equity Weighted Average	49.8	21.6	20.3	24.3	21.4	33.3	12.6
	Sample Size	34	13	25	9	47	81	1432
	Standard Deviation	23.6	14.3	10.5	6.5	11.2	22.4	9.7
	Value Weighted Average[b]	50.9	17.8	19.1	21.2	20.4	21.6	13.9
1964	Equity Weighted Average	50.8	21.0	21.9	23.9	22.0	34.4	12.8
	Sample Size	36	13	26	9	48	84	1469
	Standard Deviation	21.8	13.1	13.3	5.2	12.2	22.2	10.2
	Value Weighted Average[b]	50.2	17.2	19.0	21.4	20.5	21.6	14.1
1965	Equity Weighted Average	51.5	21.4	22.1	22.7	22.0	35.4	13.4
	Sample Size	39	12	26	9	47	86	1481
	Standard Deviation	20.5	11.0	11.1	4.3	10.2	21.5	9.9
	Value Weighted Average[b]	50.0	16.9	20.5	21.5	21.0	22.0	14.5

1966	Equity Weighted Average	49.3	22.2	21.3	23.1	21.9	35.0	13.6
	Sample Size	44	13	26	9	48	92	1547
	Standard Deviation	21.0	11.9	7.5	4.4	8.6	20.9	9.8
	Value Weighted Average[b]	38.4	17.4	21.0	21.7	21.3	22.1	14.2
1967	Equity Weighted Average	50.1	28.8	21.1	21.2	23.3	36.1	12.7
	Sample Size	43	13	25	9	47	90	1557
	Standard Deviation	20.8	39.3	7.0	5.3	21.7	25.1	10.2
	Value Weighted Average[b]	40.1	16.3	20.7	21.6	21.1	21.9	13.3
1968	Equity Weighted Average	47.9	21.0	20.7	20.7	20.8	34.2	12.6
	Sample Size	46	14	24	9	47	93	1581
	Standard Deviation	20.5	18.2	7.9	8.5	12.0	21.6	11.4
	Value Weighted Average[b]	35.9	15.2	20.6	22.6	21.6	22.4	13.8
1969	Equity Weighted Average	45.9	19.1	18.1	19.0	18.6	32.4	12.1
	Sample Size	49	15	24	9	48	97	1615
	Standard Deviation	22.7	18.1	4.6	9.6	11.5	22.6	10.3
	Value Weighted Average[b]	35.6	14.2	19.4	21.2	20.3	21.2	13.2
1970	Equity Weighted Average	37.8	18.7	18.9	13.7	17.9	28.2	10.7
	Sample Size	52	15	24	9	48	100	1581
	Standard Deviation	41.6	17.7	5.5	24.0	15.0	33.3	9.5
	Value Weighted Average[b]	34.8	14.3	19.5	21.5	20.5	21.3	11.8
1971	Equity Weighted Average	43.5	17.7	17.8	25.1	19.1	32.2	10.5
	Sample Size	55	15	24	9	48	103	1565
	Standard Deviation	21.7	18.2	6.1	7.1	11.8	21.6	9.4
	Value Weighted Average[b]	36.1	14.1	19.2	23.3	21.6	22.4	12.1
1972	Equity Weighted Average	41.4	15.7	18.1	24.8	18.6	30.8	11.7
	Sample Size	55	15	24	9	48	103	1546
	Standard Deviation	23.8	10.7	5.7	6.1	8.3	21.5	7.8
	Value Weighted Average[b]	33.9	13.8	19.2	24.6	22.4	23.0	12.7

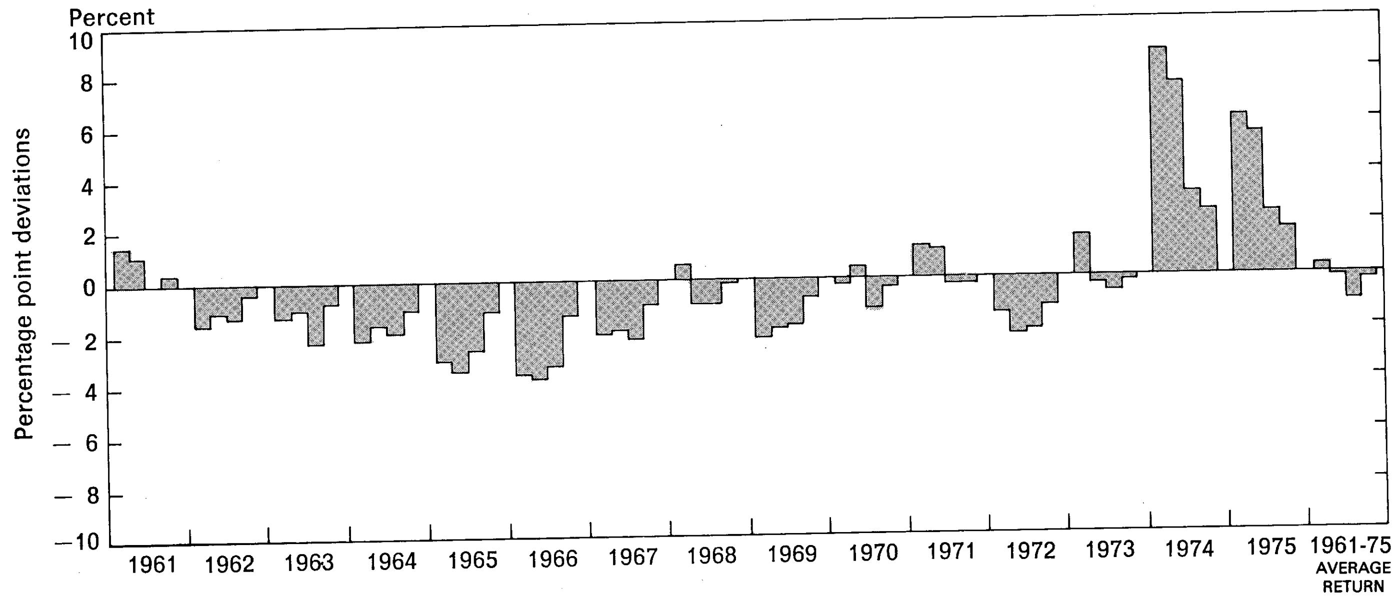
Table 6 (continued)

Year	Statistic	Standard Industrial Classification Code						
		Crude Oil & Gas 1311	Refining 2911	Integrated Domestic 2912	Integrated International 2913	Refining & Integrated 291	All Petroleum 1311 & 291	Other Mining & Manufacturing 1000-3999 less 1311 & 291
1973	Equity Weighted Average	46.2	17.5	19.8	29.1	20.8	34.3	12.3
	Sample Size	54	15	24	9	48	102	1497
	Standard Deviation	20.9	8.0	6.7	10.4	8.9	20.7	8.1
	Value Weighted Average[b]	37.5	17.0	20.7	27.4	24.8	25.5	13.0
1974	Equity Weighted Average	50.5	14.6	18.7	27.9	19.2	35.8	11.5
	Sample Size	54	15	24	9	48	102	1457
	Standard Deviation	21.6	10.5	7.9	15.8	11.5	23.6	9.2
	Value Weighted Average[b]	29.2	14.4	20.2	24.0	22.5	22.7	12.2
1975	Equity Weighted Average	50.3	12.9	17.2	25.2	17.4	34.9	11.2
	Sample Size	51	13	24	8	45	96	1436
	Standard Deviation	21.1	10.4	8.1	18.3	11.9	23.9	8.6
	Value Weighted Average[b]	28.9	12.0	19.7	19.4	19.2	19.6	12.0
1961-1975	Equity Weighted Average	47.4	19.5	19.8	23.2	20.4	33.5	12.1
	Sample Size	667	205	369	134	708	1375	22427
	Standard Deviation	24.1	17.2	8.8	11.3	12.3	23.3	9.6
	Value Weighted Average[b]	36.4	15.0	19.9	22.6	21.4	22.0	12.9

Note: For an explanation of the classification numbers in the column headings, see text, p. 10.
[a] Operating income/Net sales.
[b] Σ Operating income/Σ Net sales.
Source: Author.

Figure 1

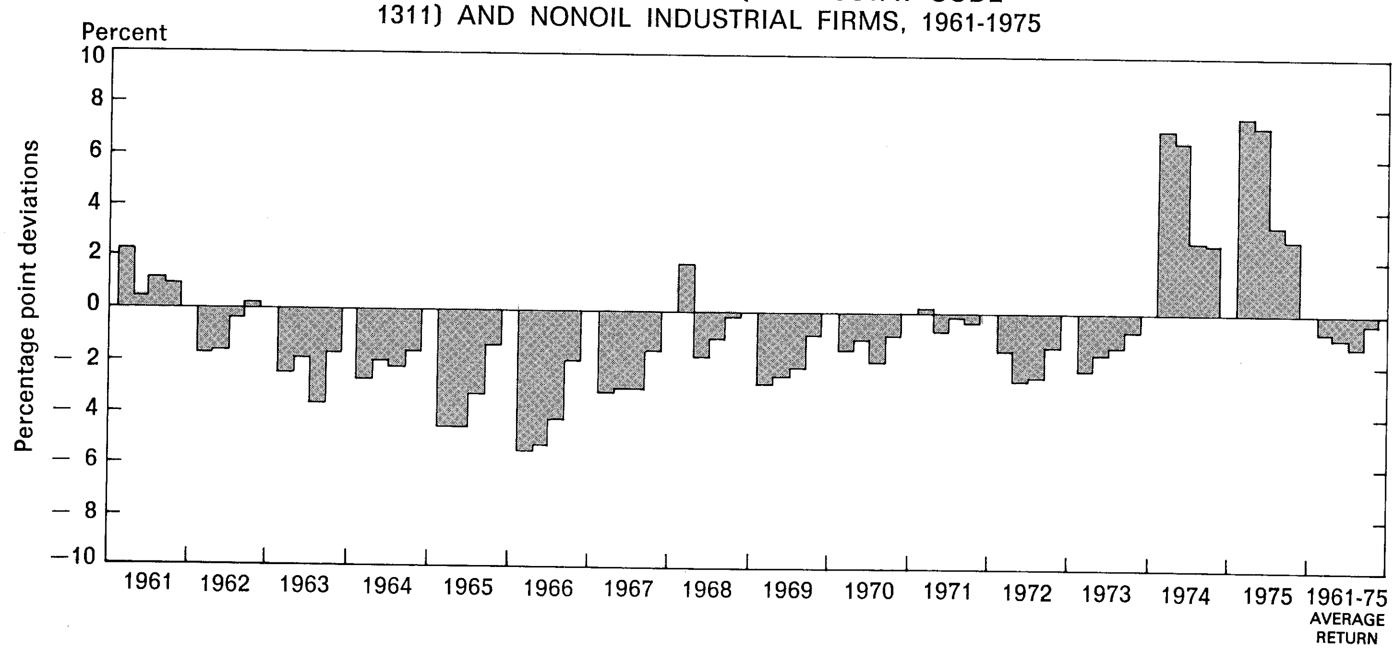
DIFFERENCES BETWEEN ACCOUNTING RETURNS FOR ALL OIL FIRMS (COMPUSTAT CODES 1311 AND 291) AND NONOIL INDUSTRIAL FIRMS, 1961-1975



Note: Four accounting rates of return are shown for each year: (1) return on common equity, (2) return on owners' equity, (3) return on capital employed, and (4) return on total assets. The number of firms in the sample varied between 75 and 104.
Source: Author

Figure 2

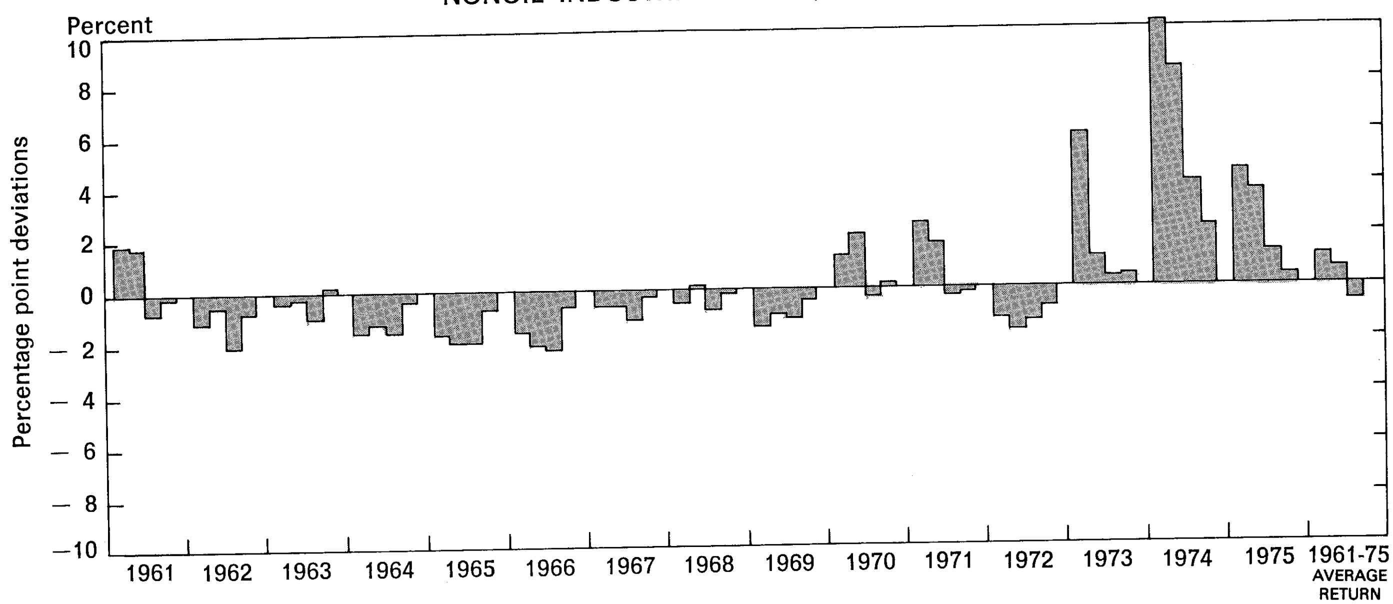
DIFFERENCES BETWEEN ACCOUNTING RETURNS FOR CRUDE OIL FIRMS (COMPUSTAT CODE 1311) AND NONOIL INDUSTRIAL FIRMS, 1961-1975



Note: Four accounting rates of return are shown for each year: (1) return on common equity, (2) return on owners' equity, (3) return on capital employed, and (4) return on total assets. The number of firms in the sample varied between 31 and 57.
Source: Author

Figure 3

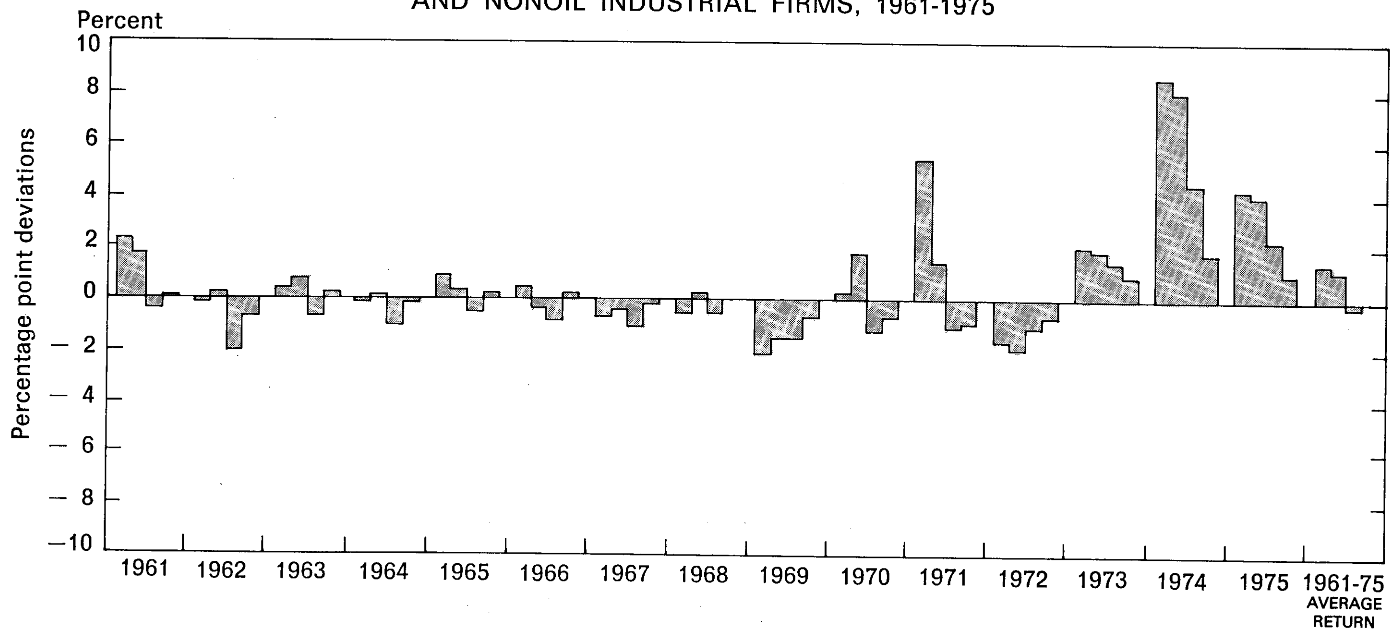
DIFFERENCES BETWEEN ACCOUNTING RETURNS FOR REFINING AND INTEGRATED OIL FIRMS (COMPUSTAT CODE 291) AND NONOIL INDUSTRIAL FIRMS, 1961-1975



Note: Four accounting rates of return are shown for each year: (1) return on common equity, (2) return on owners' equity. (3) return on capital employed, and (4) return on total assets. The number of firms in the sample varied between 44 and 48.
Source: Author

Figure 4

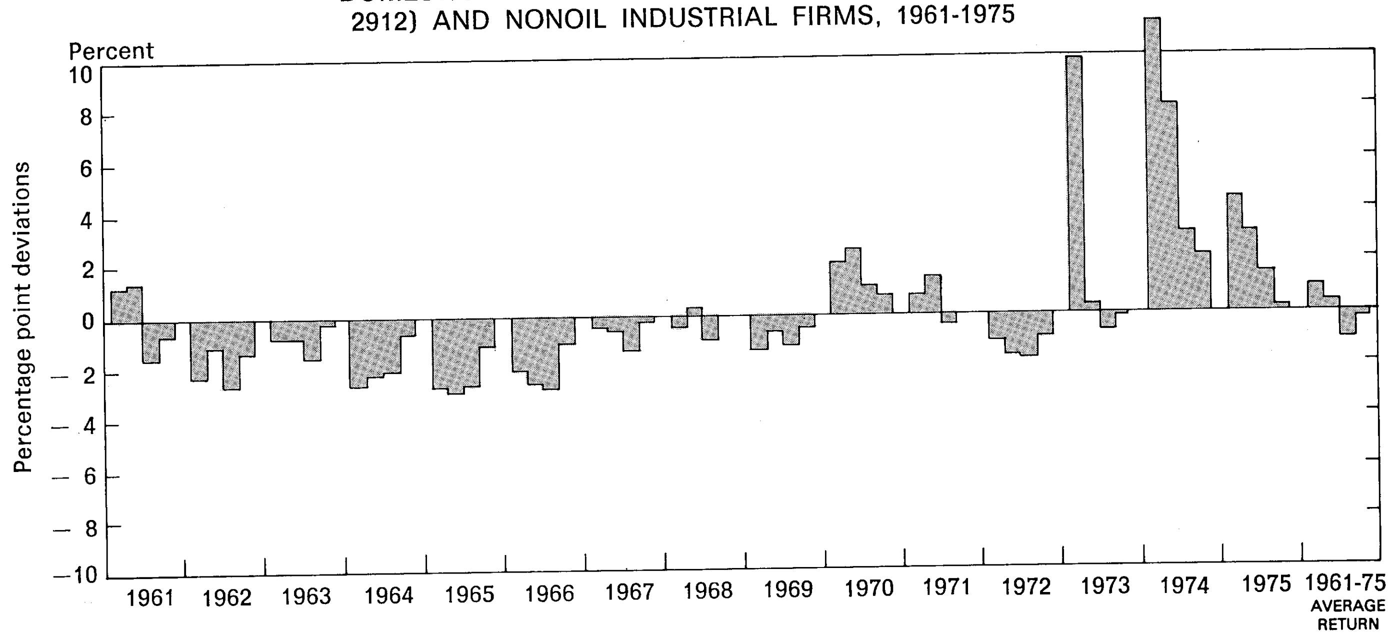
DIFFERENCES BETWEEN ACCOUNTING RETURNS FOR REFINING FIRMS (COMPUSTAT CODE 2911) AND NONOIL INDUSTRIAL FIRMS, 1961-1975



Note: Four accounting rates of return are shown for each year: (1) return on common equity, (2) return on owners' equity, (3) return on capital employed, and (4) return on total assets. The number of firms in the sample varied between 11 and 15.
Source: Author

Figure 5

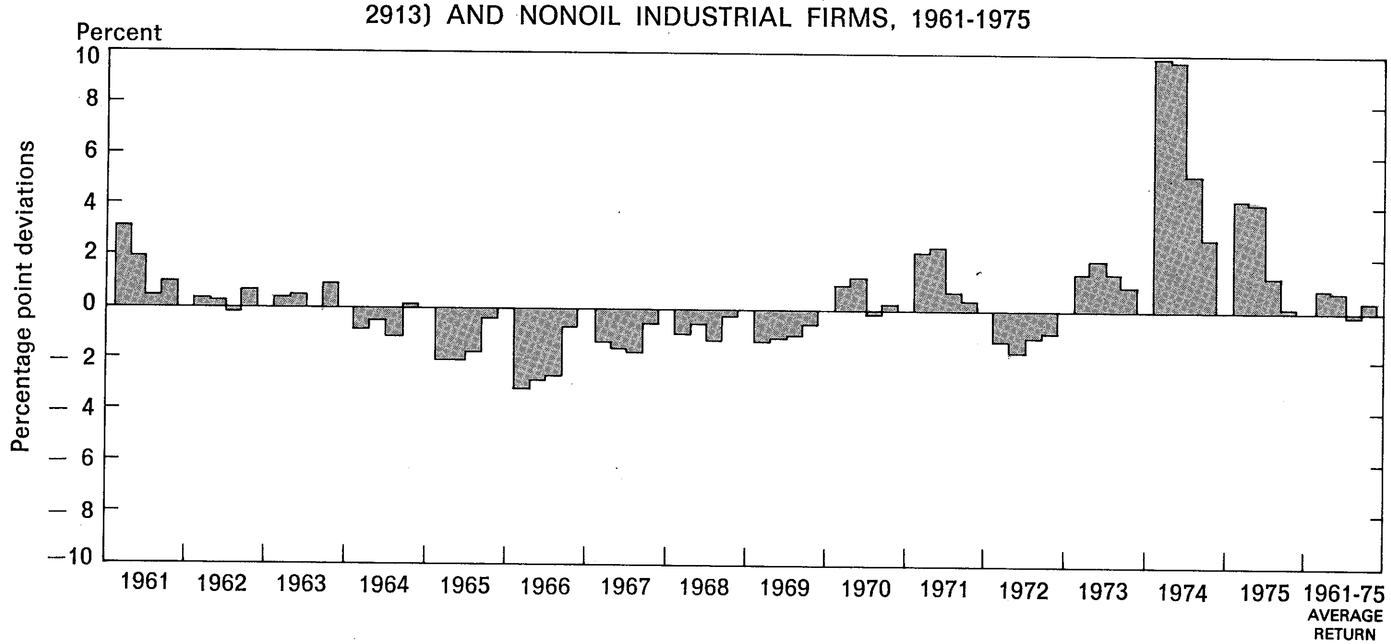
DIFFERENCES BETWEEN ACCOUNTING RETURNS FOR DOMESTIC INTEGRATED FIRMS (COMPUSTAT CODE 2912) AND NONOIL INDUSTRIAL FIRMS, 1961-1975



Note: Four accounting rates of return are shown for each year (1) return on common equity, (2) return on owners' equity, (3) return on capital employed, and (4) return on total assets. The number of firms in the sample varied between 23 and 26.
Source: Author

Figure 6

DIFFERENCES BETWEEN ACCOUNTING RETURNS FOR INTERNATIONAL INTEGRATED FIRMS (COMPUSTAT CODE 2913) AND NONOIL INDUSTRIAL FIRMS, 1961-1975



Note: Four accounting rates of return are shown for each year: (1) return on common equity, (2) return on owners' equity, (3) return on capital employed, and (4) return on total assets. The number of firms in the sample varied between 8 and 9.
Source: Author

so well publicized, its performance merely equalled the performance of nonoil firms. Relatively high returns in the subsequent two years compensated the industry for the relatively low returns throughout the 1960s. On the basis of these figures alone, one is tempted to conclude that the oil industry has made no windfall gain during the period of examination. This conclusion, however, is unjustified for several reasons. In the remaining parts of this section, we shall discuss some of the difficulties associated with the accounting estimates presented above and their interpretation. In the next section, we shall try to overcome some of these objections.

Problems of Accounting Measures of Profit

Risk Differentials. The first difficulty with intercompany and interindustry comparisons of accounting rates of return is that they do not account for risk differentials among firms and industries. In the legal and economic standards of the fair or normal return, it is explicitly recognized that return on investment in any business should be commensurate with the risk involved. It might be the case that the industry with a low rate of return is actually earning more than a normal rate of return if its risk is very low.

In conventional analysis, the total risk of a firm is broken down into two components—business risk arising from the basic nature of the business environment of the firm, and financial risk which arises from the financial structure of the firm. Equity owners of a firm bear both kinds of risk, but the rates of return on equity given in Tables 1 and 2 above do not take into account the risk differentials. When we consider the rates of return on employed capital or on total assets, the effects of financial risk are substantially eliminated.[13] Business risk differentials, however, are still unaccounted for in Tables 3 and 4. The possibility that the average returns for the oil industry are actually too high, after the difference between the risks of the oil and other industries is taken into consideration, cannot be ruled out.

Unfortunately, few widely accepted and well defined measures of business risk are available in the traditional theory of finance and accounting. A frequently used approach has been to define risk classes comprising members of a single industry and assuming that all mem-

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[13] While there is some disagreement in finance theory about whether the average cost of capital is invariant with respect to financial structure, a substantial body of literature is available to support this hypothesis. See Franco Modigliani and Merton H. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review*, vol. 48 (June 1958), pp. 261-97.

bers of a risk class have the same—though unspecified—risk. Arguments in favor of such classification depend on the similarity of the factor and product markets and technology used by the firms in an industry. Of course, no two firms are identical. A degree of arbitrariness is, therefore, unavoidable in defining a risk class. Such a measure of risk is merely classificational and not interval or even ordinal. It allows us only to compare the returns of a firm with the returns of other firms in the same industry. It is difficult to assume that the oil industry is in the same risk class as all other industrial firms. Therefore, the risk class approach is not of much use in evaluating the performance of the oil industry. For those who do not find such an assumption difficult to accept, the results given in Tables 3 and 4 would represent appropriate comparisons.

Lack of control for the difference in risk of firms presents difficulties not only in comparing the oil industry returns with returns in other industries, but also in evaluating the performance of various segments of the oil industry itself. The nature of factor and product markets of the individual firms within the oil industry varies considerably. A few large firms are vertically integrated from exploration to marketing, while most smaller companies operate in only one or two segments of the industry. Some of the integrated firms have large parts of their operation abroad where the business environment differs considerably from the domestic environment. Even among the international integrated firms, substantial differences exist with respect to the political and geographical orientation of their markets and their sources of supply. Differences between risks associated with wildcat exploration and those with oil retailing are substantial and obvious. Placing all oil firms in the same risk class supposes an implicit equivalence of such risks. Subclassification of the oil industries into four groups—international integrated, domestic integrated, refiners, and crude producers—reduces the diversity within each risk class; but within the framework of accounting rates of return, the problem of comparing one risk class to another still remains unresolved.

The Capital Markets. A second problem is that to compare the profitability of different firms and industries on the basis of accounting measures alone is to ignore the existence and operation of the capital markets. Book return as a measure of profitability is internal to the company. For an external investor, it is not the book return but the cash yield, dividends, and capital gain, that measure the return on investment, in both the short and the long run. A contemporaneous correlation between the accounting and market-based measures is not ruled out and is indeed observed in empirical tests of data. The correlation, however, is far from perfect, and there is little reason to prefer the accounting measures over the market-based measures.

A similar argument applies to appropriate measures of capital invested in a firm or industry. The accounting or book values usually are the historical amounts of capital invested. In an opportunity sense, the measure of investment in a firm is the market price of its securities and not the book value. In a perfect market, the market price is the amount investors could withdraw for their consumption or transfer to alternative investments. As long as investors continue to hold securities of a firm, their market price clearly measures the opportunity cost to the investors of such investment. Therefore, one could argue, investors will hold the securities only as long as they can be assured a normal return on their opportunity cost. The book value is irrelevant to this decision. If the book values were observed to correspond closely to the market values, use of book values to measure the invested capital might be acceptable. Empirical observation, however, shows otherwise.

This argument led us to compute a hybrid measure of return—the ratio of accounting income available for common stockholders to the market value of common equity. This ratio is the inverse of the price-earnings (P/E) ratio. The results are give in Table 7. The results are quite different from those of Tables 1 to 4. The fifteen-year, value weighted average return on market value of equity was higher for the oil firms (8.6 percent) than for the nonoil firms (6.0 percent). During each of the fifteen years under study, the value weighted return for the oil industry is higher than the corresponding return for other industries. Equally weighted averages, on the other hand, tend to be about even between oil and the other industries.

Accounting Procedures. In addition to these three external objections to accounting measures of profitability, there are two internal objections. Even if the above-mentioned objections are ignored, some difficulties remain in the interpretation of accounting measures. The first of these difficulties is caused by the diversity of accounting procedures used to arrive at the single point estimates of accounting variables found in the financial statements. The second objection refers to the systematic differences that exist between the book yield and the true yield or the internal rate of return on an investment.

In spite of the fact that the financial statements of corporations are usually prepared by procedures which conform to the generally

Table 7

RETURN ON COMMON EQUITY (MARKET VALUE), OIL INDUSTRY, 1961-1975[a]

Year	Statistic	Crude Oil & Gas 1311	Refining 2911	Integrated Domestic 2912	Integrated International 2913	Refining & Integrated 291	All Petroleum 1311 & 291	Other Mining & Manufacturing 1000-3999 less 1311 & 291
		Standard Industrial Classification Code						
1961	Equity Weighted Average	2.5	5.1	6.2	8.7	6.4	4.8	3.6
	Sample Size	31	11	24	9	44	75	1215
	Standard Deviation	3.7	4.6	2.7	2.4	3.4	4.1	8.5
	Value Weighted Average[b]	5.9	4.4	6.8	7.6	7.2	7.0	4.1
1962	Equity Weighted Average	3.3	6.8	7.2	8.7	7.4	5.7	5.9
	Sample Size	32	13	26	9	48	80	1310
	Standard Deviation	4.3	4.3	3.5	2.6	3.7	4.4	8.3
	Value Weighted Average[b]	6.4	5.6	7.7	7.4	7.4	7.3	5.8
1963	Equity Weighted Average	2.9	7.9	7.2	8.3	7.6	5.6	5.5
	Sample Size	36	13	26	9	48	84	1375
	Standard Deviation	4.8	3.5	2.6	2.5	2.9	4.5	9.5
	Value Weighted Average[b]	6.4	5.7	7.3	6.9	7.0	6.9	5.4
1964	Equity Weighted Average	3.3	6.8	6.1	7.3	6.5	5.1	6.4
	Sample Size	36	13	26	9	48	84	1409
	Standard Deviation	4.7	2.9	2.5	2.3	2.6	4.0	8.1
	Value Weighted Average[b]	5.3	4.7	6.5	6.0	6.0	6.0	5.7
1965	Equity Weighted Average	2.9	7.4	6.7	8.1	7.2	5.3	6.0
	Sample Size	37	12	26	9	47	84	1421
	Standard Deviation	4.7	3.2	3.5	3.1	3.4	4.6	6.6
	Value Weighted Average[b]	5.4	5.5	6.9	6.6	6.6	6.5	5.5

1966	Equity Weighted Average	3.6	9.5	7.9	9.5	8.6	6.4	8.4
	Sample Size	39	13	26	9	48	87	1471
	Standard Deviation	5.0	3.8	4.2	3.3	4.0	5.1	9.2
	Value Weighted Average[b]	6.0	6.0	7.8	8.2	7.9	7.8	6.9
1967	Equity Weighted Average	2.6	6.0	6.8	7.8	6.8	4.9	4.6
	Sample Size	39	12	25	9	46	85	1459
	Standard Deviation	2.7	2.8	2.6	1.2	2.5	3.4	6.0
	Value Weighted Average[b]	4.8	4.6	7.0	7.7	7.3	7.1	4.6
1968	Equity Weighted Average	2.5	4.3	5.3	6.3	5.2	3.9	3.9
	Sample Size	41	13	23	9	45	86	1506
	Standard Deviation	2.9	1.9	1.7	2.2	2.0	2.8	4.5
	Value Weighted Average[b]	4.7	3.7	5.8	7.0	6.4	6.3	4.8
1969	Equity Weighted Average	4.0	5.4	8.1	8.2	7.3	5.7	4.8
	Sample Size	43	14	24	9	47	90	1564
	Standard Deviation	4.1	3.2	5.1	3.3	4.5	4.6	11.7
	Value Weighted Average[b]	6.7	4.7	8.6	9.2	8.8	8.6	5.3
1970	Equity Weighted Average	3.6	4.9	7.9	7.2	6.8	5.2	3.3
	Sample Size	46	15	24	9	48	94	1539
	Standard Deviation	4.8	3.5	3.7	2.8	3.8	4.6	14.0
	Value Weighted Average[b]	6.0	4.1	7.8	8.2	7.8	7.7	4.8
1971	Equity Weighted Average	2.8	4.4	6.8	8.5	6.4	4.6	2.6
	Sample Size	51	15	24	9	48	99	1553
	Standard Deviation	5.0	3.7	3.5	3.1	3.8	4.8	17.2
	Value Weighted Average[b]	3.8	3.8	7.3	9.5	8.3	7.9	4.7
1972	Equity Weighted Average	2.8	4.3	6.0	6.8	5.6	4.1	5.7
	Sample Size	55	15	24	9	48	103	1537
	Standard Deviation	4.2	2.6	3.0	2.5	3.0	3.9	9.7
	Value Weighted Average[b]	3.4	2.8	6.0	7.5	6.6	6.3	4.9

Table 7 (continued)

Year	Statistic	Standard Industrial Classification Code: Crude Oil & Gas 1311	Refining 2911	Integrated Domestic 2912	Integrated International 2913	Refining & Integrated 291	All Petroleum 1311 & 291	Other Mining & Manufacturing 1000-3999 less 1311 & 291
1973	Equity Weighted Average	5.3	11.5	9.1	14.4	10.8	8.0	12.1
	Sample Size	53	15	24	9	48	101	1485
	Standard Deviation	4.5	7.4	9.0	4.8	8.1	7.0	42.8
	Value Weighted Average[b]	5.7	6.0	7.0	14.6	10.9	10.4	7.8
1974	Equity Weighted Average	14.8	21.0	21.8	33.3	23.7	19.1	12.1
	Sample Size	52	15	24	9	48	100	1414
	Standard Deviation	11.7	18.5	11.8	12.6	15.1	14.1	60.9
	Value Weighted Average[b]	15.2	13.7	14.9	28.6	21.6	21.1	11.8
1975	Equity Weighted Average	12.1	14.3	12.2	15.5	13.4	12.7	7.2
	Sample Size	51	13	24	8	45	96	1426
	Standard Deviation	6.5	13.2	9.6	5.0	10.3	8.5	39.6
	Value Weighted Average[b]	11.3	9.6	11.0	13.9	12.5	12.4	8.2
1961-1975	Equity Weighted Average	4.9	8.0	8.4	10.5	8.6	6.8	6.2
	Sample Size	642	202	370	134	706	1348	21684
	Standard Deviation	6.7	8.4	6.6	8.0	7.5	7.4	23.7
	Value Weighted Average[b]	6.1	5.4	8.1	9.6	8.9	8.6	6.0

Note: For an explanation of the classification numbers in the column headings, see text, p. 10.
[a] Available for common/Market value of common equity.
[b] Σ Available for common/Σ Market value of common equity.
Source: Author.

accepted accounting principles (GAAP), they are not always comparable, primarily because the GAAP do not define a unique set of accounting procedures; *interfirm* comparability of financial statement-based measures of profitability is limited, because of the use of different accounting procedures. Also, since firms have the option of switching from one acceptable procedure to another, provided they make adequate disclosure, *interperiod* comparability of financial performance measures is sometimes compromised. For making appropriate interfirm and interperiod comparisons, a substantial amount of additional information is often necessary. Such additional information is not always available in spite of recent improvements brought about by the rulings of the Accounting Principles Board and the Financial Accounting Standards Board.

Accounting procedures in the exploration segment of the petroleum industry present some special problems of this kind. Certain accounting practices, unique to this industry, present a problem of comparability between petroleum and other industries. Diversity of accounting practices within the petroleum industry renders even the task of making intraindustry comparisons quite difficult.[14]

Accounting measures of performance that usually involve income or income plus interest divided by a measure of capital invested—owners' equity, total assets, or owners' equity plus long-term debt—systematically differ from true yield or internal rate of return. The appropriateness of the latter and its economic significance have been amply demonstrated. Ezra Solomon[15] illustrates the systematic differences between book yield and true yield from an investment that arise from such variables as the method of depreciation and the time span of depreciation used. Since the method of depreciation is chosen arbitrarily by the management, the use of book yield for comparing

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[14] See Shyam Sunder, "Properties of Accounting Numbers under Various Definitions of Cost Centers in the Petroleum Exploration Industry," in Kenneth S. Most, ed., *Proceedings of the Southwest Regional Meeting of the American Accounting Association* (College Station, Texas: Department of Accounting, Texas A & M University, 1975); "Comparability of Divergent Financial Statements in the Petroleum Exploration Industry," in Michael Schiff and George Sorter, eds., *Proceedings of the Conference on Topical Research in Accounting* (New York: Ross Institute of Accounting Research, New York University, 1976); "Properties of Accounting Numbers under Full Costing and Successful Efforts Costing in the Petroleum Industry," *The Accounting Review*, vol. 51, no. 1 (January 1976).

[15] Ezra Solomon, "Return on Investment: The Relation of Book Yield to Time Yield," in Robert K. Jaedicke, Yuji Ijiri, and Oswald Nielsen, *Research in Accounting Measurement*, Collected Papers, American Accounting Association, 1966; "Alternative Rate of Return Concepts and Their Implications for Utility Regulation," *Bell Journal of Economics and Management Science*, vol. 1 (Spring 1970).

financial performance can lead to erroneous results when the true basis of comparison is the internal rate of return of the investment.

The difficulties associated with the accounting basis of comparison of profitabality enumerated above do not make accounting comparisons invalid, but care in using the accounting-based results is necessary.[16] In the next section, we discuss some alternative procedures, in which some of the problems of accounting data are eliminated. Since these procedures involve new problems of their own, they are by no means perfect; but the judicious use of accounting and market-based measures in combination should yield the desired insights into the performance of the petroleum industry.

[16] Also see Edward J. Mitchell, *U.S. Energy Policy: A Primer* (Washington, D.C.: American Enterprise Institute for Public Policy Research, 1974), esp. pp. 89-92 for a discussion of related issues.

3
CAPITAL MARKET-BASED MEASURES OF PROFIT

A procedure for measuring windfall gains or losses by using the modern portfolio theory and capital-asset pricing model circumvents several of the difficulties encountered in using and interpreting the accounting-based estimates mentioned earlier. These estimates of gains or losses apply to the investors' returns and not to the book values alone.

The amount of investment in a firm at any time is the opportunity cost of such investment measured by the market value of the firm's securities, not the sunk costs represented by the book values. In the market-oriented approach, an internal measure of risk is estimated for each capital asset or portfolio of assets. The existence of a linear relationship between this measure of risk and average return when the market is in equilibrium allows us to make risk-adjusted estimates of "normal" and "windfall" returns on individual assets and portfolios. An element of arbitrariness, often involved in the accounting measures, is eliminated through the use of market prices. Last, the market-based measure of returns, unlike the case of book yield discussed earlier, corresponds to the economic measure of return—the realizable yield to investors.

Of course, these gains are not without a price. A new set of assumptions must be made to justify the market-based measures. After discussing the theoretical model, a few additional assumptions have to be made to obtain the empirical measures of theoretical variables. On the whole, the relative superiority of market or accounting-based measures remains a matter of personal judgment rather than logical derivation. The next few paragraphs present the model for calculating the market-based measures of performance before giving the empirical results.

Market-Based Measures

The difficulties associated with the accounting-based measures of profitability discussed in the previous section suggest the use of a market-oriented approach. In the presence of well-functioning markets for corporate securities, it can reasonably be expected that the price of securities in the market will fairly represent the economic value of the firm as perceived by the investors in the aggregate. Whenever the price deviates from this ideal, the competitive mechanism will ensure that it is adjusted again towards its economic value. The speed of adjustment will depend on structural features of the market, such as the ease of transactions, the cost and speed of dissemination of information, and the absence of very large investors. While these conditions are not completely fulfilled by the existing structure of the securities markets, there is substantial evidence to support the view that the speed of adjustment is quite fast.[17] Such a mechanism, therefore, enables the price in the market to reflect the changes in the future prospects of the firm as perceived by the investors.

It is this futuristic orientation of the market price as a measure of the firm's economic value (in contrast with the accounting-based measures, which are oriented to the past) that makes them an attractive alternative for our purpose, measuring fair and windfall returns. While the existence of a competitive mechanism ensures adjustment toward equilibrium value, it is difficult to measure explicitly the extent of variability introduced into the prices—that is, the stability characteristics of price behavior. In other words, we can visualize two components of price variability: (1) those caused by real economic changes and (2) those caused by imperfection of the price adjustment mechanism. It is difficult to isolate these two components in practice and it is usually assumed that all the observed variability arises from the first. In this study, however, we are concerned primarily with the behavior of *mean* returns, and therfore, as long as the price adjustment mechanism is unbiased, the problem of extra variability which might be introduced in the price data through the second factor can be ignored.

[17] For a review of evidence on efficient capital markets, see E. F. Fama, "Efficient Capital Markets: A Review of Theory and Empirical Work," *Journal of Finance*, vol. 25 (May 1970), pp. 383-417.

Portfolio Theory and the Capital Asset Pricing Model

Modern Portfolio Theory. Modern theory of portfolio analysis[18] uses variability of returns as the measure of risk. The specific measure of variability most often used is standard deviation. Since standard deviation of returns is measured on a ratio-scale, it allows direct comparison among risks of various capital assets. Such comparability of risk, when combined with the relationship between risk and return (defined later in this section in the context of the capital-asset pricing model), eliminates a major objection to the accounting-based asset approach—lack of control for risk differentials.

Since most investors hold portfolios of capital assets rather than single assets, the risk of individual assets also needs to be redefined in the context of such portfolio decisions. Risk (standard deviation) of returns on a portfolio of assets is not simply the weighted sum of their individual risks (standard deviations) if the returns are less than perfectly correlated. In fact, hardly any two assets have perfectly correlated returns, and the combination of individual assets into portfolios results in the elimination of a part of their risk.

Risk of an asset with respect to a portfolio can be defined as the marginal contribution of the asset to the risk (standard deviation of returns) of the entire portfolio. The market portfolio is most commonly used as the reference portfolio to define the risk of individual assets.[19] In other words, the risk of security i is

$$\frac{d\sigma_p}{dx_i} = \frac{d}{dx_i}\left[\sum_{i=1}^{N}\sum_{j=1}^{N} x_i x_j \sigma_{ij}\right]^{1/2} = \frac{1}{\sigma_p}\sum_{j=1}^{N} x_j \sigma_{ij} = \frac{\sigma_{ip}}{\sigma_p}, \quad (5)$$

where σ_{ij} is the covariance between returns on assets i and j,
x_i is the fraction of portfolio p invested in asset i,
σ_p is the risk (standard deviation of returns) of portfolio p,
N is the number of assets, and
σ_{ip} is the covariance between returns on asset i and portfolio p.

When p is the market portfolio (M), the risk of asset i with respect to this portfolio is measured by the ratio of σ_{iM} to σ_M^2. This ratio

18 See Harry Markowitz, "Portfolio Selection," *Journal of Finance*, vol. 7 (March 1952), pp. 77-91, and *Portfolio Selection: Efficient Diversification of Investments* (New York: John Wiley & Sons, Inc., 1959).

19 See Chapters 6 and 7 of E. F. Fama and Merton H. Miller, *The Theory of Finance* (New York: Holt, Rinehart and Winston, 1972) for further details of risk algebra.

is usually referred to as the *beta coefficient*. We shall denote this ratio for asset i by β_i.

The Capital Asset Pricing Model. Having obtained an explicit measure of risk from the portfolio theory, we now need a relationship between risk and the normal or equilibrium for each asset so that actual returns can be compared with the norm to determine if any windfall gains were realized. The capital asset pricing model provides the necessary relationship.[20] The model states that under certain assumptions, the equilibrium expected return on any asset in excess of the risk-free rate of interest is directly proportional to the expected return in excess of the risk-free rate on the market portfolio. The constant of proportionality is risk β_i for asset i as defined above.

$$E(\tilde{R}_i - R_f) = \beta_i E(\tilde{R}_m - R_f) = \frac{Cov(\tilde{R}_m, R_i)}{Var(\tilde{R}_m)} \cdot E(\tilde{R}_m - R_f), \qquad (6)$$

where $\tilde{R}_i$ is the return on asset i (random variable),

$\tilde{R}_m$ is the return on the market portfolio (random variable), and

R_f is the risk-free rate of return.

The capital asset pricing model defines only a relationship between the first moments (expected values) of the probability distributions of returns on individual assets and the market portfolio. This provides us with a normal return standard for average returns which explicitly takes the risk differentials into account. A normal return standard from individual realization in any period can be conditionally defined on the risk β_j and the market return in that period, R_{mt}.[21] In a period when the market return is R_{mt}, the normal return on asset j is $[R_f(1 - \beta_j) + \beta_j R_{mt}]$. The difference between R_{jt}, return on asset j in period t, and the normal return is the unexpected, or windfall, return E_{jt} on the asset in the given period. Thus

$$E_{jt} = R_{jt} - [R_f(1 - \beta_j) + \beta_j R_{mt}] \qquad (7)$$

[20] For development of the model, see William F. Sharpe, "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk," *Journal of Finance*, vol. 19 (September 1964), pp. 425-42; John Lintner, "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets," *Review of Economics and Statistics*, vol. 47 (February 1965), pp. 13-37; Jan Mossin, "Equilibrium in a Capital Asset Market," *Econometrica*, vol. 34 (October 1966), pp. 768-83, and E. F. Fama, "Risk, Return and Equilibrium," *Journal of Political Economy*, vol. 63 (February 1971), pp. 30-55. For a more general model of relationship between risk and return which does not depend on risk aversion, see Stephen Ross, "The Arbitrage Theory of Capital Asset Pricing," *Journal of Economic Theory*, vol. 13 (December 1976), pp. 341-60.

[21] For derivation and discussion of related issues, see Michael C. Jensen, "Risk, the Pricing of Capital Assets and the Evaluation of Investment Portfolios," *Journal of Business*, vol. 42 (April 1969), pp. 167-247.

is the unexpected return on asset j in period t. Note that, in general, this return would be nonzero because the equilibrium returns are hardly ever realized in practice. Therefore, in the sense that windfall returns are the returns in excess of the normal return standard specified by the capital asset pricing model, every firm will experience either a windfall gain or a loss during any period of time. Thus, the market approach provides an unambiguous measure of unexpected returns in excess of normal returns. These returns can be subjectively and statistically examined to derive an inference about their economic importance.

Having defined the market-based measures of windfall returns, we shall discuss the procedures and some problems of estimation before presenting the results of analysis.

Some Problems of Estimation. We have to estimate two quantities—β_j and E_{jt}—for each asset j. The most commonly used estimation procedure has been to rewrite equation (8) as a simple regression model of variable $(R_{jt} - R_f)$ on $(R_{mt} - R_f)$:

$$(R_{jt} - R_f) = \beta_j(R_{mt} - R_f) + E_{jt}. \qquad (8)$$

Then, under the assumptions of uncorrelated, homoscedastic errors (E_{jt}), ordinary least-squares regression would yield an efficient and unbiased estimate of β_j. Since R_f varies little from month to month, past computational experience indicates that eliminating R_f from equation (8) makes little difference to the estimates of β_j and E_{jt}.[22] So we can simplify the regression equation (8) to:

$$R_{jt} = \beta_j R_{mt} + E_{jt}. \qquad (9)$$

In order to estimate β_j from regression equation (9) with accuracy, a sufficiently large number of observations are needed. Since only one observation on returns becomes available in each period, we need to use time series data, usually over several years, to get accurate estimates of the risk parameter. When we consider the possibility that the risk of assets can change over time, it becomes evident that ordinary least-squares regression on equation (9) is not necessarily the most efficient procedure for estimating β_j.

Tests of Stability of Risk of Oil Stocks. Since estimation of the market risk of the common stock of a firm is crucial to the definition of normal and windfall returns to the shareholders under the market value

[22] See Lawrence Fisher, "On the Estimation of Systematic Risk," presented at the Wells Fargo Symposium, July 26-28, 1971, p. III-4 for a theoretical explanation of why ignoring R_f makes so little difference.

criterion, the estimation procedure used must be suitable to the observed behavior of risk over time. If risk is a changing parameter, estimation procedures which do not take this changing nature into account (for example, ordinary least-squares estimates) will, in general, be nonoptimal. Alternative procedures for estimating the risk of stocks under change have been proposed.[23] Therefore, we first examine the data for indications of changes in risk.

Sunder[24] proposed a procedure for testing the stability of the risk coefficient of stocks. This procedure formulates the market model (9) as a random coefficients model in which coefficient β_i is a random variable. Variance of $\beta(\sigma_\beta^2)$ is estimated and tested against the null hypothesis that it is zero.[25] Estimates of the variance of the risk parameter and the ratios of estimates to their standard error for individual stocks are given in Table 8. Twenty years of data beginning in

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[23] Ibid. See also Lawrence Fisher and Jules Kamin, "Good Betas and Bad Betas: How to Tell the Difference," presented at the meeting of the Midwest Finance Association, St. Louis, Missouri, April 21, 1972; Marcus C. Bogue, "The Estimation and Behavior of Systematic Risk," unpublished dissertation, Graduate School of Business, Stanford University, 1972; Shyam Sunder, "Stock Price and Risk Related to Accounting Changes in Inventory Valuation," *The Accounting Review*, vol. 50 (April 1975), pp. 305-15.

[24] Shyam Sunder, "On the Stability of Risk of Common Stocks," Working Paper, University of Chicago, September 1976.

[25] Let σ_ϵ^2 and σ_β^2 be the error and slope variances in the market model. Then it can be shown that

$$\hat{u}_t^2 = a_{1t}\sigma_\epsilon^2 + a_{2t}\sigma_\beta^2 + w_t$$

where $\hat{u}_t^2$ = squared residual from OLS repression on the market model

w_t = error term with mean zero

$$a_{1t} = \frac{n-1}{n} - \frac{r_{mt}^2}{\Sigma r_{mt}^2}$$

$$a_{2t} = R_{mt}^2\left(1 - \frac{2}{n} - \frac{2\,r_{mt}^2}{\Sigma R_{mt}^2}\right) + \frac{\Sigma R_{mt}^2}{n^2} + \frac{r_{mt}^2}{\left(\Sigma r_{mt}^2\right)^2}\,\Sigma R_{mt}^2 r_{mt}^2 + \frac{2\,r_{mt}}{n\,\Sigma r_{mt}^2}\Sigma R_{mt}^2 r_{mt}$$

n = number of observations; all summations are from 1 to n

$r_{mt} = R_{mt} - \bar{R}_m$

$\bar{R}_m = \frac{1}{n}\Sigma R_{mt}$

This equation is a linear model and the usual estimation techniques can be used to estimate parameters σ_ϵ^2 and σ_β^2 For further details, see Sunder "On Stability of Risk of Common Stocks"; Clifford Hildreth and James P. Houck, "Some Estimators for a Linear Model with Random Coefficients," *Journal of the American Statistical Association*, vol. 63 (June 1968); H. Theil and L. B. M. Mennes, "Multiplicative Randomness in Time Series Regression Analysis," Mimeographed Report No. 5901 of the Econometric Institute of Netherlands School of Economics, 1959.

Table 8

TEST OF STABILITY OF RISK OF OIL STOCKS, SELECTED OIL COMPANIES

	Estimates of Variance of Risk	
Company	σ^2_β	σ^2_β / Standard error of estimation
1. Ashland Oil, Inc.	−0.019	−0.13
2. Atlantic Richfield Co.	0.097	0.59
3. Cities Service Co.	0.028	0.38
4. Marathon Oil Co.	0.140	1.35
5. Continental Oil Co.	0.019	0.19
6. Gulf Oil Corp.	0.002	0.02
7. Phillips Petroleum	0.139	0.97
8. Quaker State Oil	0.097	0.70
9. Shell Oil Co.	0.060	0.70
10. Skelly Oil Co.	0.129	1.12
11. Mobil Oil Corp.	0.080	1.02
12. Standard Oil of California	−0.010	−0.18
13. Standard Oil of Indiana	−0.012	−0.16
14. Exxon Corp.	0.063	1.18
15. Standard Oil of Ohio	1.598	5.97
16. Sun Oil Co.	0.025	0.45
17. Texaco, Inc.	−0.007	−0.10
18. Union Oil Co.	.12	1.34
Average	.14	.85

Source: Author.

January 1953 and ending in December 1972 have been used for this estimation. Stocks for which all 240 months of data were not available have been excluded from this analysis, leaving eighteen stocks in the sample.

An examination of Table 8 indicates that fourteen out of eighteen estimates of risk variance are positive. If the risk of these stocks were stable (variance = zero) we would expect these estimates to be symmetrically distributed about zero. In other words, we would expect as many positive estimates as negative. Under the null hypothesis that the slope variance is zero, the number of positive estimates would have a binomial distribution with parameters 18 and 0.5. The probability of obtaining fourteen or more positive outcomes from this distribution is only 0.0154. Therefore, we can reject the null hypothesis with only a 1.54 percent chance of making an error in doing so.

The average slope variance of these stocks is 0.14, which corresponds to a standard deviation of 0.37.

Rejection of the hypothesis of stable risk implies that we use an estimation procedure for risk which explicitly takes the possibility of risk changes into account. The next section describes the procedure used for the estimation of risk.

Estimation of Risk

The above-mentioned tests of stability of risk suggest the use of estimation procedures which adequately account for the variation in the risk parameter. Extensive work has been done by Fisher (1971, 1972) and Bogue (1972) in this area to compare the performance of alternative estimation procedures. Fisher has shown that an estimation procedure using Kalman filters (first proposed by Kantor for this application)[26] performs better than most others. Under this procedure, the estimate of β_j for period t, denoted by b_{jt}, is

$$b_{jt} = \sum_{s=t-T+1}^{t} \phi_s R_{ms} R_{js} \Big/ \sum_{s=t-T+1}^{t} \phi_s R_{ms}^2, \qquad (10)$$

where

$$\phi_s \begin{cases} = \phi_{s-1} + k \displaystyle\sum_{h=t-T+1}^{s-1} R_{mh}^2 \phi_h & \text{for } s > t - T + 1 \\ = 1 & \text{for } s = t - T + 1 \end{cases}$$

k is a parameter equal to the ratio of random walk step variance of β_j to the variance of error term E_{jt}, and

T is the number of past observations used for estimation of risk.

In other words, unlike ordinary least-squares estimation in which all observations are given equal weight, the Kalman filter approach assigns greater weight to observations closer to the point of estimation. The total number of observations used, T, must be selected by the researcher to balance the gain in efficiency of estimation against the obsolescence introduced by retention of old observations. Fisher (1971) has shown that ten years (120 monthly observations) is a reasonable compromise.

The rate at which weights assigned to more recent observations

[26] Michael Kantor, "Market Sensitivities," *Financial Analysts Journal*, vol. 27, no. 1 (January-February 1971), pp. 64-68.

increase depends on the value of k. Since this parameter is a ratio of two variances, its feasible values lie between zero and infinity; $k = 0$ implies that β_j is constant over time while $k \to \infty$ implies that the error term E_{jt} is identically zero in model (9). Sunder (1976) has proposed a procedure for estimating the value of parameter k for individual assets. Fisher and Kamin (1972), on the other hand, assume that the value of k is the same for all stocks and have demonstrated that under this assumption, risk parameters estimated with $k = .06$ for all stocks seem to provide good predictive ability. For computational ease under the latter method, we use $k = .06$ for all oil stocks to estimate their risk in this study.

Since the estimate of risk, β_j, is the most important quantity in the measurement of windfall gain, we estimated windfall gains for various groups of stocks from the following four different sets of risk estimates:

(A) The ordinary least-squares estimate from stock-price data for the ten-year period ending December 1960. We denote this estimate by $\hat{\beta}_A$. For a given stock, the same estimate is used throughout the 180 month period from January 1961 to December 1975 for which windfall returns are computed. The estimate $\hat{\beta}_A$, therefore, is completely independent of the stock price behavior during the study-period 1961-1975.

(B) The risk estimates in the second set are also ordinary least-squares estimates from model (9). The data used for estimation, however, are from the ten-year period ending one month before the month for which windfall return is to be estimated. For example, in order to estimate windfall returns for January 1965, data for the ten years ending November 1964 are used.[27] Thus the risk estimates for later months of the study period use the return data from earlier months of the study period and therefore are not independent of the latter. These estimates are denoted by $\hat{\beta}_B$.

(C) A third set of risk and windfall return estimates was obtained by using the Kalman filter procedure defined in equation (10) above using ten-year data for the period January 1951 to December 1960. The same set of estimates of risk ($\hat{\beta}_C$) was used to estimate windfall returns throughout the study period.

[27] See Fisher (1971) for an argument to the effect that it helps to discard the data for the period immediately preceding the point of estimation—in this case December 1964.

Table 9

ABNORMAL MARKET RETURNS, OIL INDUSTRY, 1961-1975

	Method of Risk Estimation	1961	1962	1963	1964	1965	1966
All Oil Firms (1311 + 291)	A	—.080	.188	.023	.003	—.101	.100
	B	—.074	.177	.048	.030	—.062	.080
	C	—.073	.185	.028	.007	—.097	.099
	D	—.074	.191	.051	.032	—.058	.085
Crude Oil Firms (1311)	A	.013	.242	.043	—.062	—.005	—.069
	B	.021	.225	.064	—.042	.010	—.068
	C	.019	.239	.047	—.059	—.006	—.067
	D	.019	.239	.061	—.044	.007	—.070
Refining and Integrated Oil Firms (291)	A	—.103	.175	.019	.017	—.121	.137
	B	—.098	.165	.044	.045	—.076	.119
	C	—.096	.171	.023	.021	—.116	.135
	D	—.097	.1783	.0478	.0478	—.072	.120
Refining Firms (2911)	A	—.206	.167	.015	—.018	—.064	.124
	B	—.198	.153	.042	.010	—.030	.117
	C	—.195	.161	.021	—.013	—.055	.122
	D	—.195	.162	.045	.012	—.024	.119
Domestic Integrated Firms (2912)	A	—.129	.142	.031	.010	—.096	.214
	B	—.123	.129	.062	.043	—.047	.192
	C	—.123	.139	.035	.014	—.092	.200
	D	—.123	.144	.065	.045	—.042	.193
International Integrated Firms (2913)	A	.003	.228	.003	.057	—.205	.010
	B	.005	.226	.020	.079	—.160	—.008
	C	.009	.225	.006	.060	—.200	.009
	D	.008	.239	.024	.081	—.155	—.010

(D) A fourth set of estimates was obtained by using the Kalman filter estimation on ten-year moving time series data ending a month before the point of estimation. Thus the data used for these risk estimates ($\hat{\beta}_D$) were the same as for estimates $\hat{\beta}_B$, but the estimation procedure was different.

Abnormal Returns

Abnormal returns for six oil portfolios—crude oil (1311), refining (2911), domestic integrated (2912), international integrated (2913),

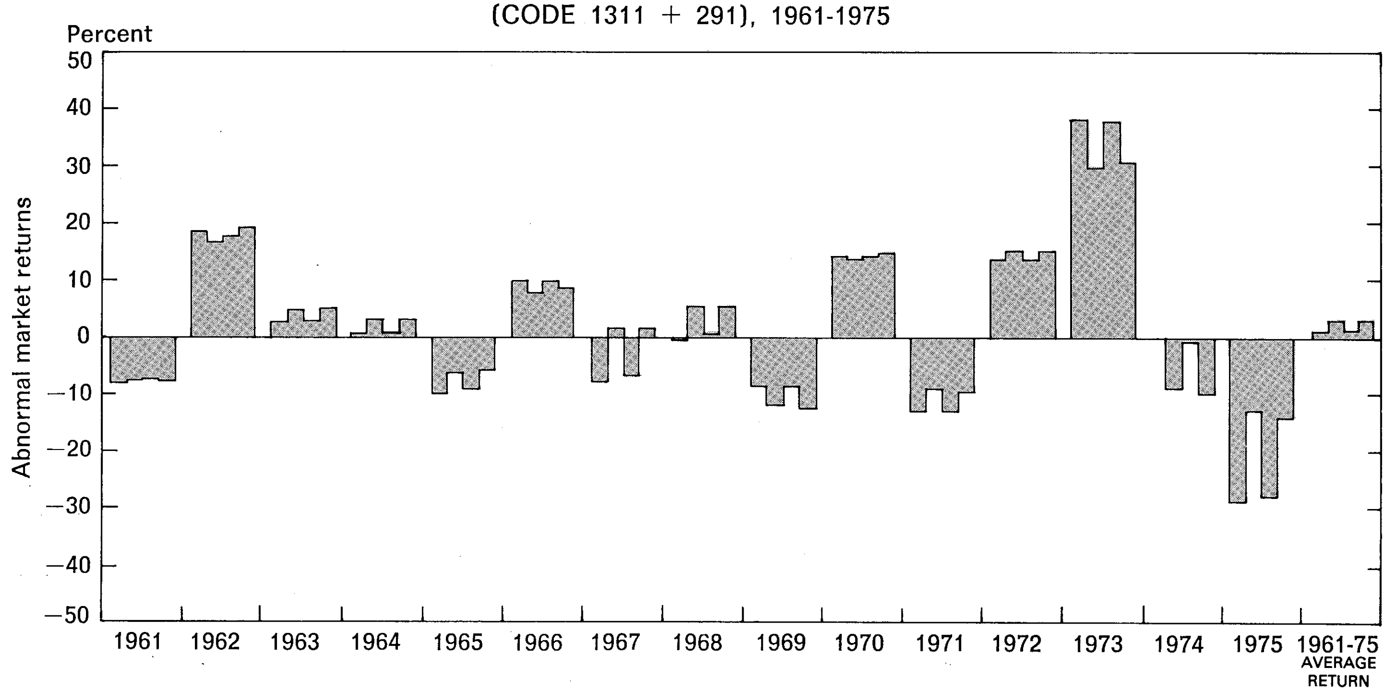
1967	1968	1969	1970	1971	1972	1973	1974	1975	1961-1975
—.071	—.001	—.083	.143	—.128	.140	.388	.000	—.283	.239
.013	.056	—.121	.140	—.088	.157	.302	—.088	—.124	.453
—.065	.003	—.085	.143	—.127	.140	.385	—.003	—.279	.262
.013	.057	—.127	.145	—.093	.157	.312	—.100	—.138	.453
.103	—.041	—.067	.156	—.083	.205	.338	.108	—.439	.422
.111	—.034	—.070	.155	—.074	.210	.305	.063	—.331	.546
.101	—.042	—.068	.156	—.083	.205	.341	.110	—.441	.453
.112	—.037	—.075	.158	—.080	.210	.322	.055	—.360	.516
—.126	.014	—.088	.137	—.148	.107	.410	—.046	—.221	.162
—.020	.089	—.140	.134	—.095	.131	.301	—.152	—.042	.406
—.119	.019	—.091	.137	—.146	.108	.405	—.050	—.214	.188
—.019	.091	—.1470	.140	—.100	.131	.308	—.165	—.050	.414
—.072	.136	—.119	—.028	—.290	.026	.261	—.271	—.147	—.487
—.023	.148	—.090	—.021	—.289	.025	.265	—.251	—.132	—.275
—.064	.140	—.117	—.028	—.293	.025	.268	—.266	—.156	—.451
—.031	.147	—.100	—.026	—.305	—.024	.279	—.248	—.157	—.297
—.154	—.051	—.164	.180	—.124	.142	.595	.038	—.380	.255
—.023	.042	—.238	.173	—.059	.172	.449	—.108	—.116	.550
—.146	—.046	—.168	.179	—.121	.144	.589	.026	—.371	.278
—.019	.045	—.243	.1810	—.063	.171	.468	—.127	—.131	.557
—.128	.057	.070	.146	—.128	.083	.173	—.089	.003	.283
—.018	.138	.009	.140	—.073	.108	.080	—.182	.113	.476
—.120	.062	.065	.146	—.124	.085	.165	—.096	.014	.305
—.013	.140	.001	.149	—.075	.108	.075	—.191	.123	.505

Note: For a description of the four methods of risk estimation, here labeled A, B, C, and D, see text, pp. 57-58.
Source: Author.

refining and integrated (291), and all oil firms (1311 and 291)—are shown in Table 9 for the fifteen years from January 1961 to December 1975. The table shows equally weighted average unexpected returns for individual stocks in the respective portfolios from four different sets of risk estimates described earlier. Figures 7 to 12 are graphic representations of this table. The following observations can be made on the basis of these data.

(1) Though results obtained from the four different methods of risk estimation A, B, C, and D are not identical, they are similar in many respects. This indicates that the results of

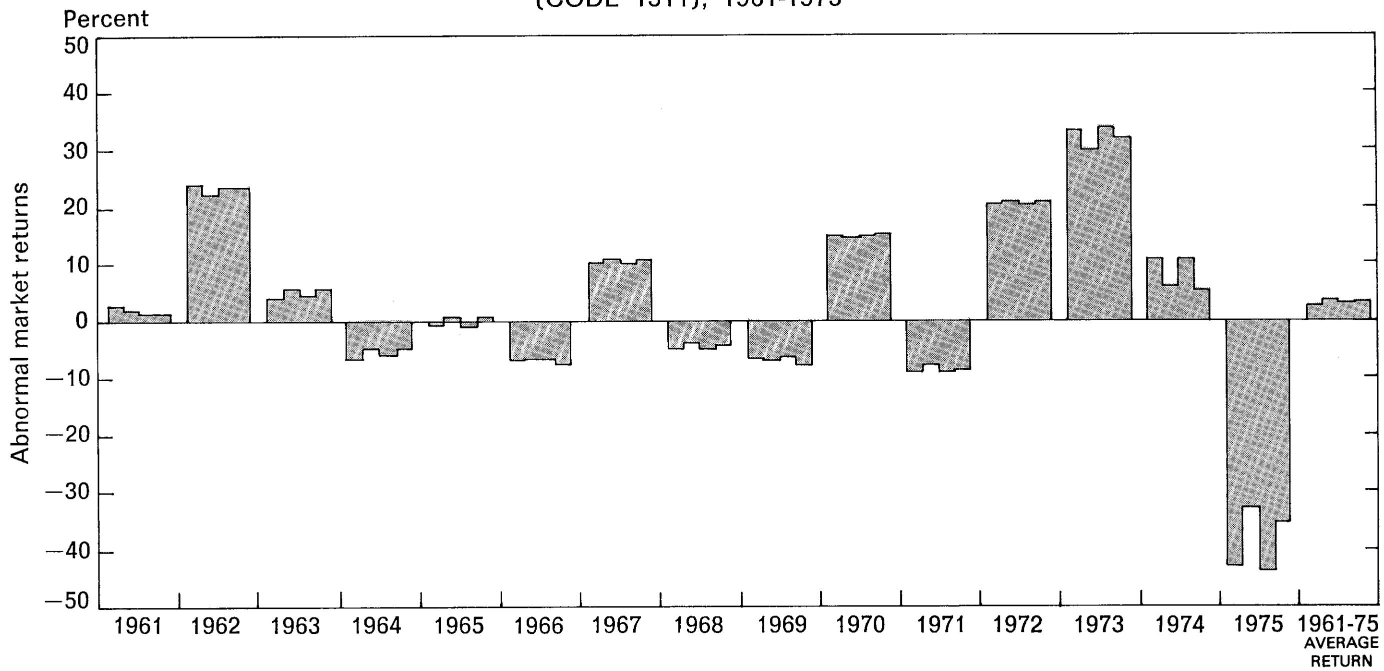
Figure 7
ABNORMAL MARKET RETURNS, ALL OIL FIRMS
(CODE 1311 + 291), 1961-1975



Note: The four estimates of abnormal return correspond to risk estimates A, B, C, and D respectively, listed in Table 9. The number of firms in the sample varied between 34 and 44.
Source: Graphic representation of data in Table 9.

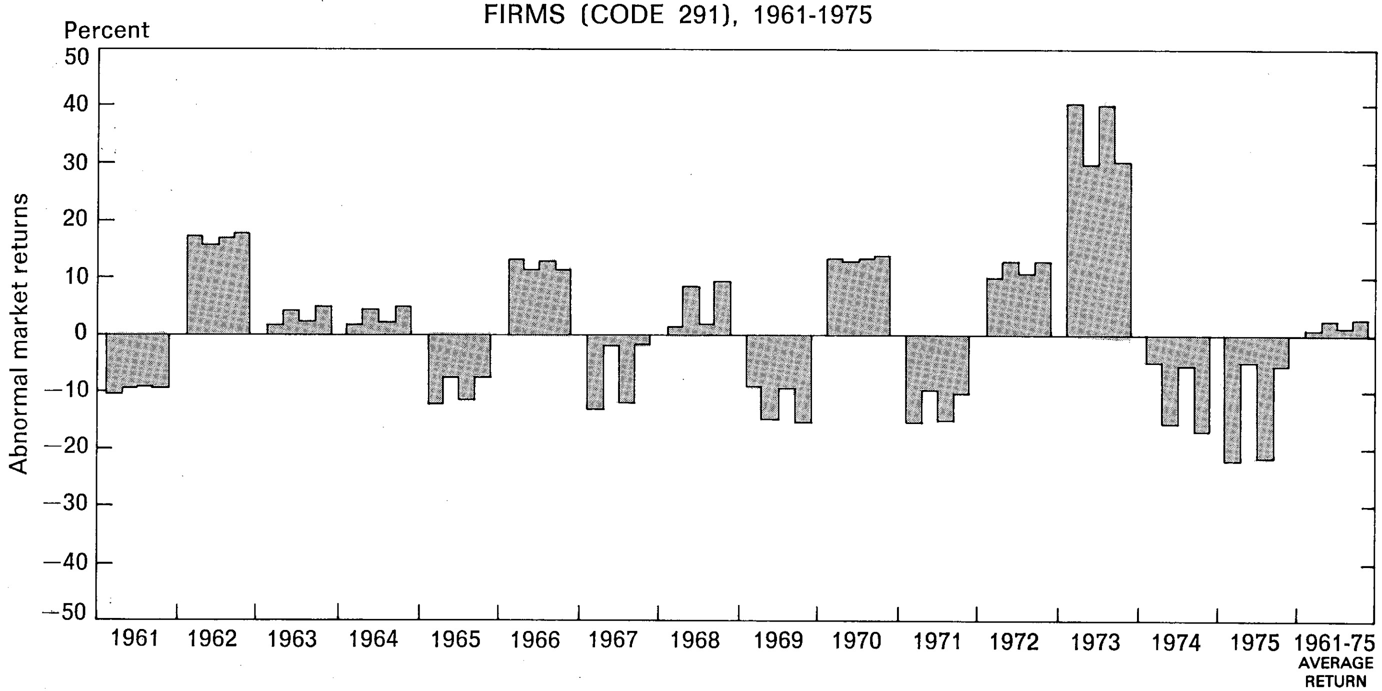
Figure 8

ABNORMAL MARKET RETURNS, CRUDE OIL FIRMS
(CODE 1311), 1961-1975



Note: The four estimates of abnormal return correspond to risk estimates A, B, C, and D respectively, listed in Table 9. The number of firms in the sample varied between 6 and 14.
Source: Graphic representation of data in Table 9.

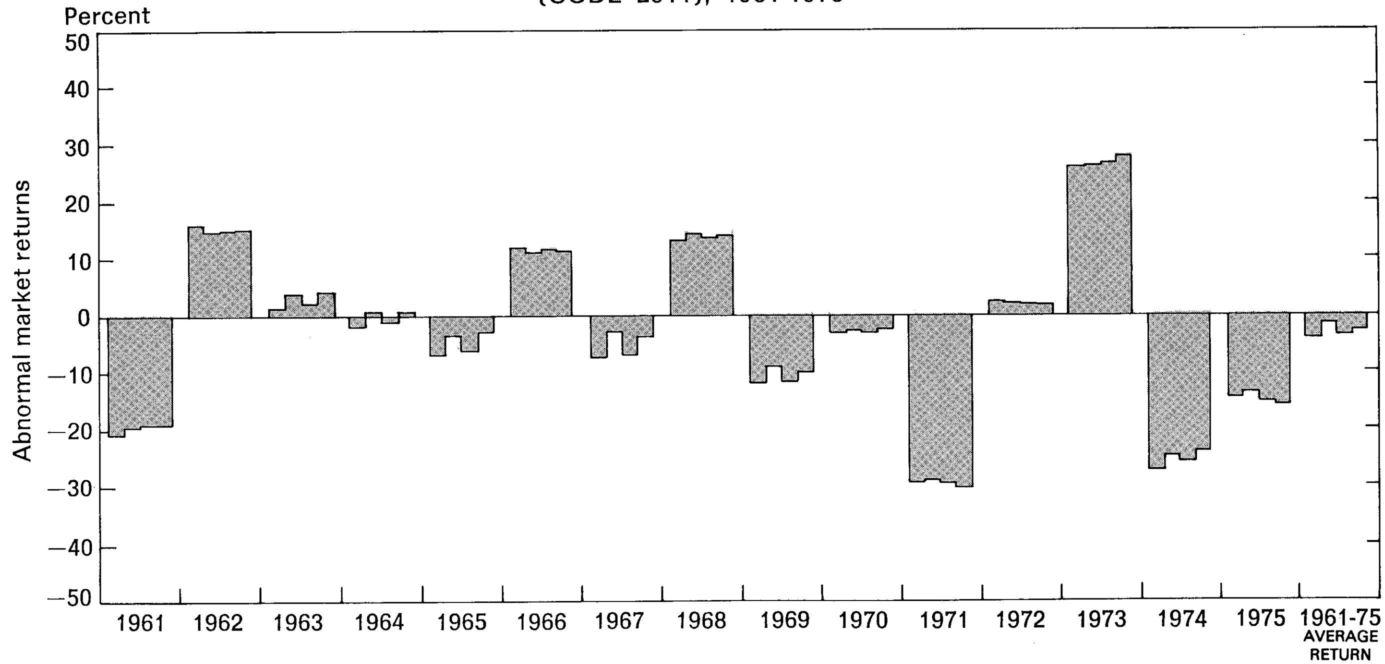
Figure 9
ABNORMAL MARKET RETURNS, REFINING AND INTEGRATED FIRMS (CODE 291), 1961-1975



Note: The four estimates of abnormal return correspond to risk estimates A, B, C, and D respectively, listed in Table 9. The number of firms in the sample varied between 28 and 33.
Source: Graphic representation of data in Table 9.

Figure 10

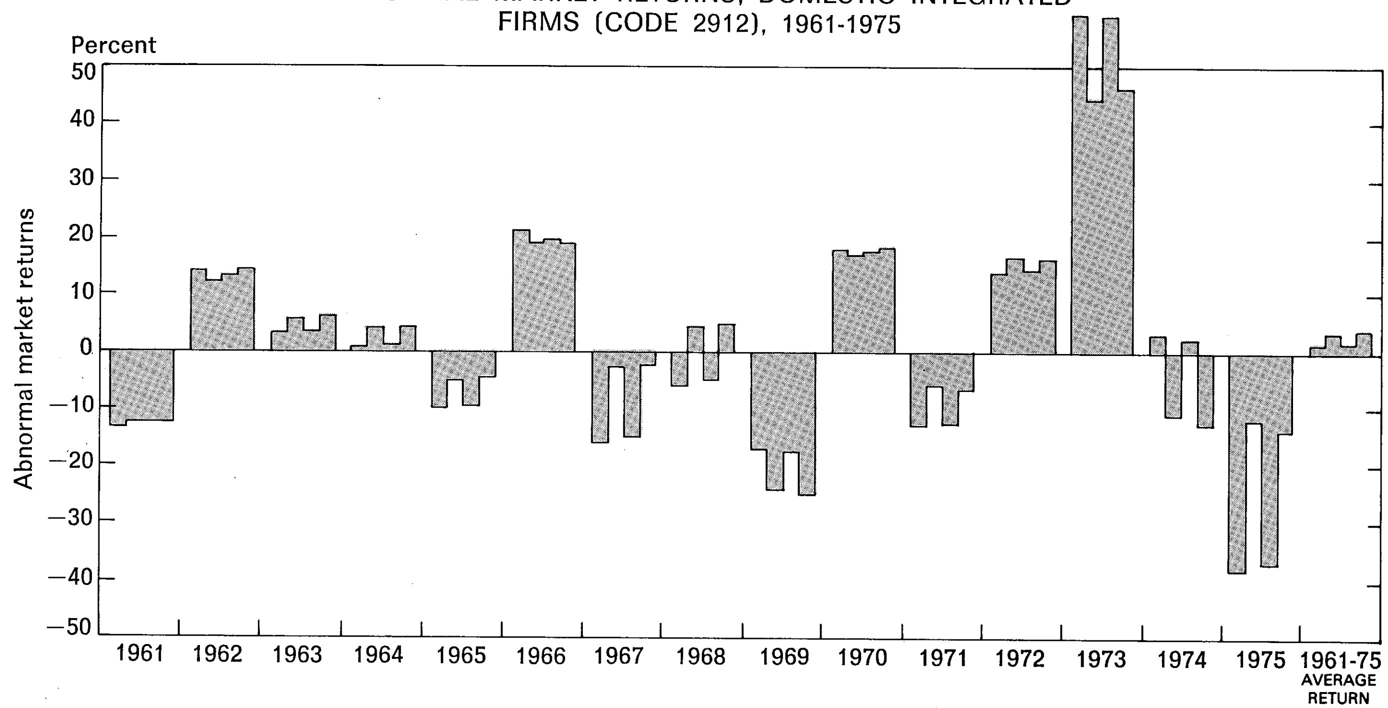
ABNORMAL MARKET RETURNS, REFINING FIRMS
(CODE 2911), 1961-1975



Note: The four estimates of abnormal return correspond to risk estimates A, B, C, and D respectively, listed in Table 9. The number of firms in the sample varied between 4 and 8.

Source: Graphic representation of data in Table 9.

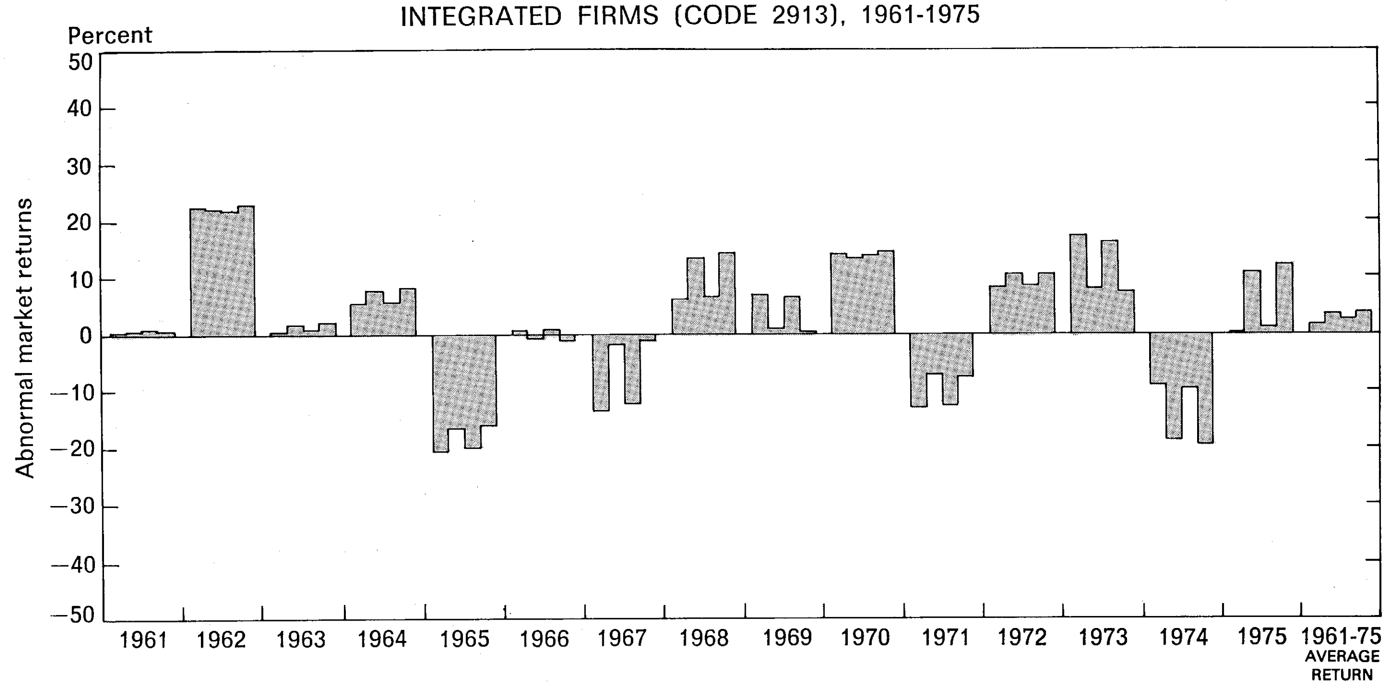
Figure 11
ABNORMAL MARKET RETURNS, DOMESTIC INTEGRATED FIRMS (CODE 2912), 1961-1975



Note: The four estimates of abnormal return correspond to risk estimates A, B, C, and D respectively, listed in Table 9. The number of firms in the sample varied between 13 and 16.
Source: Graphic representation of data in Table 9.

Figure 12

ABNORMAL MARKET RETURNS, INTERNATIONAL INTEGRATED FIRMS (CODE 2913), 1961-1975



Note: The four estimates of abnormal return correspond to risk estimates A, B, C, and D respectively, listed in Table 9. The number of firms in the sample varied between 7 and 12.
Source: Graphic representation of data in Table 9.

analysis of market prices for the oil industry are relatively robust with respect to the method of risk estimation.

(2) For the oil companies as a group, the risk-adjusted abnormal return was positive in eight years, negative in seven. The average abnormal return over fifteen years was 1.6 to 3 percent, depending on the risk estimate used. It is obvious from Figure 7 that the cumulative abnormal return of fifteen years is no greater than the abnormal return of a simple year—1973. Given the volatility of the stock market, this abnormal return could easily be wiped out in a single year. During the most recent four years, abnormal returns for the oil industry have been particularly volatile and probably reflect the recent turmoil in the environment of that industry. While the ex post abnormal return for the oil companies has been positive, it is difficult to conclude that it is the result of a consistent pattern of abnormally high returns.

From the point of view of stock price returns, 1973 was the best year for the oil industry—and 1975 its worst. These results provide an interesting contrast with the results of the analysis of the accounting measures of profitability presented earlier. During 1972 when the accounting profits of the oil industry were low, the stock market values indicated unexpectedly high returns to the stockholders. The same was true for 1962. In 1973, on the other hand, record earnings were accompanied by unexpectedly high stock market returns. The sharpest contrast in the performance measures is seen in 1974-1975, when extremely high accounting returns were accompanied by abnormally low stock market returns.

The results for industry subgroups—crude oil firms (SIC code 131) and refining and integrated firms (SIC code 291) given in Figures 2 and 3 are qualitatively similar to the results for all oil companies discussed above.

In an earlier study,[28] Mitchell examined the average annual rates of return to stockholders of various firms in the oil industry and

[28] Edward J. Mitchell, *U.S. Energy Policy: A Primer*, National Energy Study 1 (Washington D.C.: American Enterprise Institute for Public Policy Research, 1974), p. 94. More up-to-date figures are available in U.S. Congress, Senate, Committee on the Judiciary, Subcommittee on Antitrust and Monopoly, *The Petroleum Industry: Hearings on S. 2387 and Related Bills, Vertical Integration,* part 3, 94th Congress, 1st session, January 21 to February 18, 1976, p. 1877, and in U.S. Congress, Senate, Committee on the Judiciary Subcommittee on Antitrust and Monopoly, *The Industrial Reorganization Act: Hearings on S. 1167. The Energy Industry,* part 8, 93rd Congress, 2nd session, August 6-9, 1974, p. 6061.

Table 10

OIL INDUSTRY STOCKHOLDERS' AVERAGE ANNUAL RATE OF RETURN AND STANDARD AND POOR'S 500 STOCK COMPOSITE INDEX, 1953-1972 AND 1960-1972

	1953-1972		1960-1972	
Average Return				
Refiners				
Domestic	11.3%	(14)	11.7%	(21)
International	12.5	(5)	11.0	(5)
Canadian	12.4	(1)	13.5	(3)
Producers				
Domestic	9.0	(2)	6.3	(10)
Canadian	21.4	(1)	19.0	(6)
Overseas	—		17.8	(4)
Standard and Poor's 500 Composite Stock Index	15.6		12.8	

Note: The numbers of firms in the sample are shown in parentheses. Annual rate of return that would yield same increase in value over the period as realized price appreciation with dividends reinvested. Figures shown are averages of three rates of return based on three alternative price assumptions: (1) Stock purchased at initial year's high, sold at final year's high, with all dividends reinvested at succeeding year's high, (2) stock purchased at initial year's low, sold at final year's low with dividends reinvested at succeeding year's low, and (3) stock purchased at initial year's closing price, sold at final year's closing price, with dividends reinvested at succeeding year's closing price.

Source: Edward J. Mitchell, *U.S. Energy Policy: A Primer.* National Energy Policy Study 1 (Washington, D.C.: American Enterprise Institute for Public Policy Research, 1974), p. 94.

compared them to the performance of Standard and Poor's 500 Stock Composite Index. His results are summarized in Table 10. Except for the Canadian and overseas firms, the average return to stockholders of oil firms during 1953-1972 and 1960-1972 had been lower than the average returns on Standard and Poor's 500. These results are in apparent contradiction to the results presented in Table 9 and Figures 7 to 12, mainly because no adjustments for differences in risk have been applied to the returns in Table 10. For the oil industry as a whole, and for most individual firms, risk relative to the market is less than one. Therefore, the equilibrium returns for these firms are also proportionately less than the returns on the market portfolio. The differences in returns after this adjustment for risk differentials has been made are presented in Table 9.

A second reason for the differences between Tables 9 and 10 is the absence of exact correspondence between the time series and sample firms used to compute the returns. Mitchell's results are given for years 1953-1972 and 1960-1972 while our results are for the years 1961-1975. The sample used in the present study is also more comprehensive (See Appendix).

4
DISCUSSION OF RESULTS AND CONCLUSIONS

In the preceding sections, we have presented the results of investigations into the profit performance of the oil industry over the past fifteen years from two different perspectives. Briefly, the analysis of accounting variables supports the view that the profitability of the oil business has been no better than the profitability of other industrial firms during the past fifteen years. The recent increase in the price of petroleum products seems to have helped to raise their profitability to relatively high levels.

Whether the high accounting profits of the past two years represent a transient phenomenon or a new level of profitability is crucial to questions of public policy with respect to the oil industry. A large part, though not all, of these profits can be traced to inventory holding gains. Since oil prices have risen faster than the general price level in the past three years, real economic gains have accrued to these firms as a result. Whether such gains will continue to accrue in the future depends largely on the behavior of oil prices in relation to the general price level. Considering the large number of factors that bear upon this relation, it is hard to argue persuasively that the oil profits of the past two years are not merely transient phenomena.

The fact that the accounting rates of return for the oil industry throughout the sixties and the early seventies remained lower than the returns on other industries can be used to argue that the equilibrium accounting rates of return for this industry are relatively low, possibly because of lower risk. The argument can be buttressed by the fact that relatively low rates of return persisting over more than a decade do not seem to have driven capital investment away. Instead, these were years of healthy growth for the industry. This argument, however, does not significantly alter our inference from the data. It is clear that if the rates of return realized in the last two years persist, the oil industry will be more profitable than the norm. We have no way to determine empirically whether they will persist.

Analysis of the market data reveals that the risk adjusted profitability of the industry has been better than the average performance of the firms listed on the New York Stock Exchange. The market has evaluated the performance and prospects of the industry as quite healthy and profitable. However, the high volatility of the abnormal stock returns prevents us from placing too much confidence in the positive sign of abnormal returns. The small positive abnormal returns observed for the fifteen-year period can be attributed to the improved prospects of the oil industry over these years. The competitive nature of the stock market ensures that the prices reflect this anticipation of the future prospects of the industry by investors and that abnormal returns appear only in those periods when the prospects change.

The anticipatory nature of stock prices is only a mixed blessing from the point of view of the policy maker. In spite of the other advantages of stock market returns over accounting returns discussed earlier, the former are problematic for the policy maker because they tend to be affected by prospective changes in public policy toward the firm or industry involved. In spite of record accounting profits during 1974-1975, the stock market performance of the oil industry during these years was poor. This phenomenon has been partly explained by the market's anticipation of the potential effects of unfavorable legislation that had been under consideration by the Congress over this period. Favorable changes in public policy are similarly anticipated by the market. This feedback effect between public policy and return to investors poses a difficult problem for the policy maker: How and to what extent should the anticipatory reactions of the market be allowed to affect the policy? This problem is absent in accounting data which are oriented exclusively to past events.

APPENDIX

SAMPLE OF OIL FIRMS

CUSIP No.	Name	Industry Code	Data Available on Compustat	Data Available on CRSP
7239	Adobe Oil and Gas Corp.	1311	√	
23511	Amerada Hess Corp.	2912	√	√
23555	Amerada Petroleum	1311	√	
28861	American Petrofina	2912	√	
37519	Apco Oil	2912	√	√
38402	Aquitane Co. Canada Ltd.	1311	√	
43411	Asamera Oil Corp.	1311	√	
44539	Ashland Oil Canada Ltd.	1311	√	
44540	Ashland Oil Inc.	2912	√	√
48825	Atlantic Richfield Co.	2912	√	√
52519	Austral Oil Co.	1311	√	
54897	Aztec Oil and Co.	1311	√	√
59887	Bandf Oil Ltd.	1311	√	
68221	Barnwell Indus.	1311	√	
69689	Baruch Foster Corp.	1311	√	
70113	Basin Petroleum Corp.	1311	√	
77419	Belco Petroleum Corp.	1311	√	√
102169	Bow Valley Indus.	2911	√	
110889	British Petroleum Co. Ltd.	2913	√	√
124187	Buttes Gas and Oil Co.	1311	√	
124664	C & K Petroleum Inc.	1311	√	
135681	Canadian Export Gas & Oil	1311	√	
136033	Canadian Homestead Oil	1311	√	
136051	Canadian Hydrocarbons Ltd.	2911	√	
136366	Canadian Merrill Ltd.	1311	√	
136645	Canadian Superior Oil	1311	√	
161177	Charter Co.	2911	√	√[a]

Sample of Oil Firms (Cont.)

CUSIP No.	Name	Industry Code	Data Available on Compustat	Data Available on CRSP
168664	Chieftain Devlpmt. Co. Ltd.	1311	√	
173036	Cities Service Co.	2912	√	√
181486	Clark Oil & Refining Corp.	2911	√	√
196504	Colorado Interstate Corp.	1311	√	√
203201	Commonwealth Oil Refining	2911	√	√
209705	Consolidated Oil & Gas	1311	√	
211813	Continental Oil Company	2912	√	√
226219	Crestmont Oil & Gas Co.	1311	√	
228219	Crown Central Petroleum Corp.	2912	√	
229385	Crystal Oil Company	2912	√	
235766	Damson Oil	1311	√	
257093	Dome Petroleum Ltd.	1311	√	
270308	Earth Resources Co.	2911	√	
270389	Eason Oil	1311	√	
280587	Edgington Oil Co.	2911	√	
302290	Exxon Corp.	2913	√	√
314387	Felmont Oil Co.	1311	√	
344074	Flying Diamond Oil	1311	√	
368820	Gen. Amer. Oil Co. of Texas	1311	√	√
374280	Getty Oil Company	2912	√	√
402460	Gulf Oil Corp.	2913	√	√
423452	Helmerich & Payne	1311	√	√
437272	Home Oil Co.	1311	√	
442281	Houston Oil & Minerals Corp.	1311	√	
444222	Hudson Bay Oil & Gas Co.	1311	√	
448096	Husky Oil Ltd.	2911	√	
453038	Imperial Oil Ltd.	2911	√	
456623	Inexco Oil Co.	1311	√	√[a]
482031	Juniper Petroleum	1311	√	
492386	Kerr-McGee Corp.	2912	√	√
492995	Kern County Land	1311	√	
502444	LVO Corp.	1311	√	√
526570	Leonard Refineries Inc.	2911	√	√
546268	Louisiana Land & Exploration	1311	√	√
559244	Magna Oil Corp.	1311	√	
565097	Mapco Inc.	1311	√	√
565845	Marathon Oil Co.	2912	√	√
590655	Mesa Petroleum	1311	√	√
598342	Midwest Oil Corp.	1311	√	√
606592	Mitchell Energy & Dev.	1311	√	

Sample of Oil Firms (Cont.)				
CUSIP No.	Name	Industry Code	Data Available on Compustat	Data Available on CRSP
607080	Mobil Oil Corp.	2913	√	√
626717	Murphy Oil Corp.	2912	√	√
638760	Natomas Co.	2913	√	√
658136	North Canadian Oils Ltd.	1311	√	
670522	Numac Oil & Gas	1311	√	
670858	OKC Corp.	2912	√	√
674599	Occidental Petroleum Corp.	1311	√	
679043	Oklahoma Natural Gas Co.	1311	√	√
694750	Pacific Petroleums Ltd.	2911	√	√
698063	Pan Ocean Oil	1311	√	
702544	Pasco Inc.	2911	√	
703347	Patrick Petroleum Co.	1311	√	
709903	Pennzoil Co.	2912	√	√
716451	Petro-Lewis Corp.	1311	√	
718507	Phillips Petroleum Co.	2912	√	√
746991	Pure Oil Co.	2911		√
747419	Quaker State Oil Refining	2912	√	√
752805	Ranger Oil (Canada) Ltd.	1311	√	
761066	Reserve Oil & Gas	2912	√	√[a]
763359	Richfield Oil Corp.	2911	√	√
780257	Royal Dutch Petroleum Co.	2913	√	√
811267	Scurry-Rainbow Oil Ltd.	1311	√	
819360	Shamrock Oil & Gas Corp.	2911	√	√
822635	Shell Oil Co.	2912	√	√
822703	Shell Transport & Trading Ltd.	2913		√
823118	Shenandoah Oil Corp.	1311	√	
829251	Sinclair Oil Corp.	2912	√	√
830575	Skelly Oil Co.	2912	√	√
853683	Standard Oil Co. of Calif.	2913	√	√
853700	Standard Oil Co. of Indiana	2912	√	√
853734	Standard Oil Co. of Ohio	2912	√	√
866762	Sun Co.	2912	√	
866815	Sun Oil Co.	2911		√
867663	Sunray DX Oil Co.	2912	√	√
868273	Superior Oil Co.	1311	√	√
880370	Tenneco Inc.	2913	√	√
881609	Tesoro Petroleum Corp.	2911	√	√[a]
881694	Texaco Inc.	2913	√	√
882534	Texas Intl. Co.	1311	√	√[a]
882593	Texas Oil & Gas Corp.	1311	√	√
882990	Texas Gulf Producing Co.	1311		√
882991	Texas Pac. Coal & Oil Co.	1311		√

Sample of Oil Firms (Cont.)

CUSIP No.	Name	Industry Code	Data Available on Compustat	Data Available on CRSP
886461	Tidewater Oil Co.	2912	√	√
891508	Total Petroleum of North America	2911	√	
907770	Union Oil Co. of Californina	2912		√
909755	United Cansco Oil & Gas	1311	√	
911358	United Refining Co.	2911	√	√[a]
912322	U.S. Natural Resources	1311	√	
913802	Universal Resources	1311	√	
957110	Westates Petroleum Co.	1311	√	
958060	Western Decalta Petroleum	1311	√	
967231	Wichita Indus.	1311	√	
968990	Wilcox Oil Co.	2912		√
971889	Wilshire Oil of Texas	1311	√	√[a]
980140	Woods Petroleum Corp.	1311	√	

SUMMARY: NUMBER OF FIRMS IN SAMPLE

Source of Data	Industry Code 1311	2911	2912	2913	291	Total
Accounting Data (Compustat)	63	17	26	9	52	115
Stock Price Data (CRSP)	18	11	24	10	45	63

Note: CUSIP No. is the identification number of the common stock securities issued by each corporation; Industry Code is four digit Standard Industrial Classification code; COMPUSTAT is the file of financial data for business corporations published by Investors Management Services, Inc., Denver, Colorado; CRSP is the file of stock price data published by the Center for Research in Security Prices, University of Chicago.

[a] Available data insufficient for analysis of stock price returns.

Source: Author.

Oil Industry Profits, by Shyam Sunder, examines the profitability of the oil industry over the fifteen-year period from 1961 to 1975, using data from accounting reports and stock prices. Sunder's analysis of accounting data supports the conclusion that the oil industry has been no more profitable than other industrial firms during the past fifteen years. His analysis of the stock market data indicates that the risk-adjusted profits to the investor during this period have been slightly greater than the average profits for all firms listed on the New York Stock Exchange. The small positive abnormal profits realized over the fifteen-year period may be attributed to a small improvement in the prospects of the industry over these years. Because of the competitive nature of the stock market, stock prices reflect the investors' assessments of an industry's future prospects, and abnormal profits appear only in periods when those prospects change.

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$2.75

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