AN EMPIRICAL STUDY OF FINANCIAL ANALYSTS' VALUATIONS
USING PROPOSED DISCLOSURES ABOUT OIL AND
GAS PRODUCING ACTIVITIES

DISSERTATION

Presented to the Graduate Council of the
North Texas State University in Partial
Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

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Denton, Texas
December, 1983
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1983

This empirical study is concerned with the usefulness of proposed supplementary disclosures for oil and gas producers to financial analysts in valuing a company. It is concerned with what supplementary information is being used, to what extent it is being used and which type of information is used most. Three main research procedures are employed.

In the first procedure, the Mann-Whitney U Test is applied to determine any significant difference between valuing an oil and gas producing company using basic financial statements and ratio data, and valuing the same company with this information plus the proposed disclosures. The second procedure involves applying the chi-square and Cramer's V statistics to determine whether the disclosure information caused switching in valuation method used for each of the cases. The third procedure tests for significant differences between financial ratios used for each case by employing the test of differences between two
proportions. Additional evaluation attempts to determine analysts' perceived usefulness of each of the schedules of the proposed disclosures.

The following conclusions are reached. There is a significant difference in analysts' valuations of an oil and gas producing company using only basic financial statements and valuations using basic financial statements plus the proposed disclosures. This occurs for all analysts grouped and for those using the asset valuation methods. No significant difference is found for those using the relative value methods, and no determination can be made for those using the net present value methods because of small sample size. The results indicate that supplemental disclosures cause a change in valuation methods for those analysts using the relative value methods and the net present value methods. Supplementary disclosures appear to have no effect on analysts' preferences for ratios between the two cases. Analysts perceive the two disclosure schedules of reserve quantity and standardized measures as useful, but it appears the other three disclosure schedules have little value to them.
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CHAPTER I

INTRODUCTION

Current knowledge suggests that historical cost based financial statements do not provide sufficient information for an adequate understanding of the value of an enterprise with oil and gas producing activities. The Statement of Financial Accounting Concepts No. 1 says that "financial accounting should provide information that is useful to present and potential investors and creditors and others in making rational investment, credit and similar decisions."¹ Unique operating characteristics of oil and gas producing companies, such as dry well risk, negligible relationship between exploration costs and resulting reserve value, and a prolonged time lag between discovery and sale of reserves, render the historical cost based financial statements of these companies less relevant than accounting data for other industries.²


In April, 1982 the Financial Accounting Standards Board (FASB) issued a Proposed Statement of Financial Accounting Standards entitled "Disclosures about Oil and Gas Producing Activities,"^3 which was intended to amend FASB Statements Nos. 19^4 and 25.5 The basic objective of this dissertation is to conduct a field experiment to determine the usefulness of these proposed disclosure requirements to financial analysts in the Dallas/Fort Worth, Houston and Oklahoma areas in applying their valuation techniques to oil and gas producing companies. The study identified which type of disclosure information was being used and the extent to which it was used.

This chapter includes a statement of the problem, historical perspectives on financial valuation and accounting for oil and gas production activities, the purpose of the research, the hypothesis, the methodology of the study, the limitations of its findings, the expected


contribution to the knowledge of how financial statements are used, and the organization of the study.

Statement of the Problem

The purpose of this study was to determine if there was a difference in analysts' estimates of value of oil and gas producing enterprises between valuation based only on basic financial statements and valuation based on basic financial statements plus supplementary disclosure data.

The cost of existing oil and gas reserves is not a relevant indicator of either cash inflows from production and sale of those reserves or cash outflows necessary to replace those reserves. Historical cost financial statements of oil and gas producing companies are deficient for assessing timing, amounts and uncertainty of expected net cash flows to the company. Their usefulness is also limited because a uniform method of accounting is not required for costs incurred in oil and gas producing activities. The FASB and the Security and Exchange Commission (SEC) have made attempts to develop supplementary disclosures to assist users in assessing future net cash flows, estimating values of mineral reserves, and

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6 FASB, "Disclosures about Oil and Gas Producing Activities," p. 29.
comparing operating results of companies in the industry.\(^7\)

One possible approach to studying the usefulness of data supplementary to the financial statements of oil and gas producing entities is to isolate one homogeneous group and research its behavior related to supplementary data. Such a group was identified as financial analysts who routinely evaluate financial statements and supplementary disclosures to determine the expected value of an oil and gas producer's common stock.

Financial analysts apply any number of valuation models to derive stock value. These models can be classified into three categories: present value models, traditional price-earnings analysis frequently referred to as relative value methods, and asset valuation models.\(^8\) The models have been applied in a varying mix over time to determine stock value.

An analyst begins with historical cost-based financial statements. The actual use of supplementary information has received little empirical investigation. Analysis of the actual use of supplementary information hinges on answering the following questions.

\(^7\)Ibid., p. 30.

1. Is supplementary disclosure information being used?
2. If so, to what extent is it being used?
3. Which type of information will be used most?

A secondary objective of this research was to determine whether supplementary information is used to a greater extent in any one of the valuation models.

Historical Perspective

This study used valuation methods to determine the usefulness to analysts of the proposed disclosure requirements for oil and gas producing activities. The nature of the study required knowledge of both the theory and practice of valuation techniques in general, and the history and development of accounting regulations for oil and gas producers. For this reason, the historical perspective is presented in two parts. The first discusses theory and practice of valuation techniques in general which is detailed in Appendix A. The second covers the history and development of accounting regulations for oil and gas producers which is presented in detail in Chapter II.

Theory and Practice of Valuation Techniques

Stockholders' wealth is maximized when expected returns from current and future investment, as reflected in share price, are maximized. Within the constraints of the current
business cycle and an industry's performance in it, stock price is estimated by determining the present value of expected future cash flows and the risks of not attaining them; or by evaluating historical price performance through fundamental or technical analysis and projecting future performance discounted for risk; or by establishing liquidation values discounted for uncertainty. Appendix A presents a detailed description of the development and application of financial theory and valuation techniques.

The three valuation methods of particular concern to this study are the net present value methods, the relative value methods and the asset valuation methods. Present value methods may be applied for a constant period growth rate or for multi-period growth rates, and may use either expected dividends, earnings or cash flows. The basic tenets underlying all of the present value models are that stock value will rise if the investor's required rate of return decreases, if the expected growth rate of dividends increases or if some combination of these improves the risk-reward relationship. The data used in the present value methods are taken from fundamental analysis which employs a substantial amount of past and projected financial statement data. Fundamental analysis influences investor

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9Hawkins and Campbell, pp. 3-4.
judgement concerning the rate of return. The problem of annual accounting reports not providing sufficient information for valuation is aggravated in industries where earnings poorly represent the basic economic characteristics of the industry. One such industry is oil and gas producing companies where cost of existing oil and gas reserves is not a relevant indicator of either cash inflows from production or cash outflows necessary to replace those reserves. Hawkins and Campbell suggested individual analysts tend to use the constant growth model because of its simplicity and of its understandability to those unfamiliar with equity valuation theory.

Relative value methods of valuation apply either fundamental or technical analysis, relying heavily on past performance, but saying little about projected cash flows to investors or the rate of return required by them. Current P/E multiples are compared to past P/E multiples and to current and past earnings multiples for the market. Investor's attitudes toward the ability to sustain high earnings growth and toward the definition of acceptable

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10 Ibid., p. 32.
11 Ibid.
risk premium have changed. The proliferation of accounting standards means earnings determined in the past by generally accepted accounting principles may no longer be directly comparable to earnings determined from current principles. These changes resulted in investors wanting higher premiums and rejecting high growth rate projection, both of which mean they are less willing to pay high multiples for stock. This renders comparing current and past multiples less useful.\textsuperscript{13} However individual analysts generally use some form of relative price-earnings analysis as a convenient historical summary rather than principal input for investment decision making. Joel Stern places relative valuation in its proper perspective with financial theory by suggesting that EPS should not be used as an analytical device. It confuses investment decisions with financing decisions. He favors a cash flow method defined as the function of net operating profit after taxes, new capital invested, the expected rate of return on new capital invested, the length of time this is expected to exist, the degree of business risk associated with the product lines, and the income tax savings provided by debt financing. He suggests these six variables account for all systematic

\textsuperscript{13}Hawkins and Campbell, pp. 57-58.
price changes.\textsuperscript{14}

Asset valuation methods concentrate on identifying stocks that can be purchased below the book value per share, the net current asset value per share, and sometimes below the cash value per share. They consider earnings and dividends only of minor importance. The intrinsic value approach is generally attributed to Benjamin Graham who recommended buying stocks with low debt to equity ratios, low P/E's, prices below book value and, if possible, below net tangible asset value.\textsuperscript{15} Hawkins and Campbell identify three approaches to book value investment strategy as asset analysis focus, asset valuation service, and intrinsic value and margin of safety.\textsuperscript{16} See Appendix A for detailed descriptions of these methods. The Value Line Investment Survey lists stocks selling at a discount from liquidation value. Forbes publishes a list of "Loaded Laggards" which often includes companies selling at or near book value.

The primary unknown variable in all equity valuation methods and in some of the relative valuation methods is either the projected growth rate of dividends or the


\textsuperscript{16}Hawkins and Campbell, pp. 73-74.
projected growth rate of earnings. The sustainable growth rate equation is used in practice to tie together much of the historical and proforma fundamental growth rate analysis.\textsuperscript{17} The sustainable earnings growth rate equation focuses on the need for financial statement data that is a relevant indicator of cash flows from production. In the oil and gas production industry, cost of existing oil and gas reserves as stated in the basic financial statement is not a relevant indicator of either cash inflows from production and sale of reserves or cash outflows necessary to replace those reserves.\textsuperscript{18} Historical cost financial statements of oil and gas producers are deficient for assessing timing, amounts and uncertainty of expected net cash flows to the company.

Financial profile evaluations are also performed to focus on the ability to finance fixed assets with internally generated funds, dependency on external sources of financing, effect of this dependency on shareholder interest, and effects of the financial profile on dividend payout. Under-depreciation causing overstated profits on which high income taxes are paid, along with insufficient retained earnings and distorted balance sheets have created an

\textsuperscript{17}Ibid., p. 80.

\textsuperscript{18}FASB, "Disclosures about Oil and Gas Producing Activities," p. 29.
unjustified sense of well-being. A financial profile analysis would help identify liquidity restrictions and heavy reliance on external financing needs.\textsuperscript{19}

A Brief Review of the Development of Accounting Regulations for Oil and Gas Producing Activities

Prior to the mid 1950's most oil and gas producers used successful-efforts accounting that applied expenses and capitalization for exploration, development and production activities in differing ways. The full-cost method was developed in the mid 1950's but it too was applied in differing ways. Other variations in both successful-efforts and full-costing accounting methods were summarized in FAS No. 19.\textsuperscript{20} By 1970 approximately half of the publicly traded oil and gas producing companies were using full-cost, but most of the larger companies were using successful-efforts.\textsuperscript{21}

The Arab oil embargo of 1973 stimulated public interest which resulted in the issuance of FAS No. 19 in December, 1977. It adopted a version of successful-efforts

\textsuperscript{19}Hawkins and Campbell, pp. 99-105.

\textsuperscript{20}FASB, "Financial Accounting and Reporting by Oil and Gas Producing Companies," para. 110.

\textsuperscript{21}Horace R. Brock, John P. Klingstedt, and Donald M. Jones, Accounting for Oil and Gas Producing Companies (Denton, Texas: Professional Development Institute, 1981), p. 55.
accounting, but was rejected by the SEC in August 1978. The SEC concluded neither successful-efforts nor full-costing methods provided a meaningful presentation of efforts to find petroleum reserves, or to reflect the major assets of oil and gas reserves. It then required supplemental disclosures for oil and gas producers through a new method called reserve recognition accounting (RRA). RRA required disclosure of mineral reserve quantities, capitalized costs, costs incurred, reserve "value" and a performance statement based on those "values." The SEC then recognized the RRA method had shortcomings and directed the FASB to develop disclosure requirements, but not to involve determination of the appropriate historical cost method. The FASB issued an exposure draft in April 1982 detailing suggested required supplementary disclosures, which were used in case presentation for this study. The exposure draft was modified slightly and issued as FAS No. 69 in November 1982. Chapter II of this dissertation presents a thorough review of the history and development of accounting regulations for oil and gas producing activities.

Purpose of the Research

The primary objective of this study was to determine if supplementary information based on the FASB's proposed
disclosure requirements would be utilized by Dallas/Fort Worth, Houston and Oklahoma area financial analysts to assess the expected stock price of an oil and gas producing enterprise.

The secondary objectives were to determine whether supplementary disclosure data would be used for valuation to a greater extent in any one of the three categorized valuation models, and to determine whether one type of supplementary information would be preferred over any other type.

Additionally, the study allowed gathering comments from analysts regarding unique methods of analysis and use of supplementary information.

Hypothesis

In order to accomplish the primary objective, the following research hypothesis was formulated:

There is no difference in financial analysts' valuation of an oil and gas producing company using only basic financial statements and valuation using basic financial statements plus supplementary disclosures.

In addition, this study had secondary objectives as follows:

1. To determine the extent basic financial statements are used,

2. To determine the extent ratios are used,

3. To determine the extent supplementary disclosures are used,

4. To determine what type of supplementary information (capitalized costs, costs incurred, results of operations based on historical data, proved oil and gas quantities, and standardized measure of discounted future net cash flows) would be most used by analysts,

5. To gather additional comments regarding the supplementary information,

6. To determine other valuation models being used routinely in valuing oil and gas producing companies.

Methodology

In order to achieve the objectives of this study two cases were prepared on an oil and gas producing enterprise. The first case (see Appendix B) included two years of historical cost based financial statements and five years of historical cost ratios, the S&P 500 indices and petroleum industry indices. The second case (see Appendix C) included all the information provided in the first case plus supplementary disclosures of capitalized costs, costs incurred,
results of operation based on historical cost, proved oil and gas quantities, and the standardized measure of discounted future net cash flows. The supplementary disclosure information was prepared in conformance with the April 15, 1982 FASB proposed disclosure requirements. Both cases included identical perspective information on exploration history and capability, major management policies, current budget, emphases and management depth.

Forty-two financial analysts in the Dallas/Fort Worth, Houston and Oklahoma areas were randomly chosen for personal interviews. A letter of introduction requesting analyst participation, along with a letter of endorsement of the project by the head of the finance department of North Texas State University (see Appendix D) were sent to the analysts in the sample group. Each analyst was given Case I first for completion and return to the interviewer. Then Case II was given for completion.

The interview form requested answers to (a) determining expected stock price; (b) identifying method of analysis used as net present value, relative value, asset valuation, any other method, or any combination of these; (c) and stating whether financial statements were used, which financial ratios were used, which supplementary disclosure data were used, and specifying any other information used.

\(^{23}\text{Ibid., pp. 16-21.}\)
The interview form was pretested by faculty and doctoral graduate students of the finance and accounting departments of North Texas State University, and two certified financial analysts in the Dallas area.

It was expected that an analysis of the most frequently used valuation method by mean, median, standard deviation, skewness coefficient and kurtosis coefficient for both Case I and Case II would demonstrate the samples did not appear to have come from normally-distributed populations. Also it was expected the differences in variance will suggest the assumption of homoscedasticity was not present, which condition ruled out the proper application of parametric tests. If the parametric test was not meaningful for analysis of the largest group, then it would be even less meaningful for the remaining smaller groups.

The Mann-Whitney test is a rank test which is valid for all types of populations, whether continuous, discrete or mixtures of both. It has also been referred to as the Wilcoxon test. In this case the experimenter has obtained two samples and desires to see if the null hypothesis of identical populations can be rejected. When the samples are ordinal-type data, the main interest is the difference in locations of the two populations. The two samples were combined into a single ordered sample by using the stem-and-leaf method, and ranked from smallest to largest values.
adjusting for ties. The test statistic is the sum of the ranks assigned to values from one of the populations. If the sum is too small at the .05 confidence level, there would be an indication that values from that population tend to be smaller than for the other population. This would then cause rejection of the null hypothesis of no difference between the two populations.

The Mann-Whitney U test, described in greater detail in Chapter IV, was applied to the collected data to determine any significant differences between Case I respondents and Case II respondents, in the aggregate for the three categories of analysis methods, for each method, and for any combinations of methods. Any significant differences were attributed to the use of supplementary disclosure information by the respondents to Case II. Each valuation method was evaluated by stating the mean relative ranking, the U or Z values, and the two-tailed probability level. Summary information was provided concerning the number of analysts using each of the valuation methods, frequency distributions of expected stock prices within each valuation method, and preferences for the use of various disclosure schedules.

It was expected that significant differences would occur in the valuations for Case I and Case II for each valuation method used, based on general knowledge that
supplementary information is useful. It was further expected that the asset valuation method would be the one most frequently used. It was expected the supplementary disclosures of quantity, capitalized costs, costs incurred, and results of operation for producing activities would be considered useful by the majority of respondents; but the standardized measure of discounted future net cash flows and changes therein related to proved oil and gas would not.

Limitations of the Study

One of the more obvious limitations to this study is the user group studied included only one of many different groups using accounting information. A study of a sample of Dallas/Fort Worth, Houston and Oklahoma area analysts is representative only of that group. Thus the results of this study can not necessarily be generalized to analysts in other areas or to other user groups. However, it is believed these area analysts possessed considerable expertise with analyzing oil and gas producing activities.

The use of recently proposed supplementary disclosure information, which may not be thoroughly familiar to analysts, might have caused different results of valuation than those that would have been obtained by using disclosures which are familiar to the analysts. The results of this study can be generalized only for the time period when the study was conducted.
The use of the same Case I basic financial information for Case II could introduce a bias in valuation of the two cases. However, the clarity and precision provided the analysis by using the same basic financial data more than compensates for this minimal bias.

Stock price estimates made under controlled and isolated research conditions in the presence of an interviewer might have been different from those made in the natural environment. This is a problem of most behavioral research studies.

Information content of some of the supplementary disclosures relies on proved reserves only. This completely ignores the value which might be attributed to probable and possible reserves. This study could fall short of detecting true value if probable reserves are substantial. This limitation was consistent through all interviews.

Contribution

This study will further the finance profession's knowledge of which stock valuation methods and which types of supplementary disclosures are actually used in practice by Dallas/Fort Worth, Houston and Oklahoma area analysts. The study will further the accounting profession's knowledge of usefulness of the proposed supplementary disclosure requirements for oil and gas producing activities for analysts in these areas. This study will further the
knowledge of regulatory agencies, such as the SEC, regarding the usefulness of reserve "value" accounting to the financial analysts in the test area.

Organization of the Study

Chapter II presents a review of the history and development of accounting regulations for oil and gas producing activities.

Chapter III reviews the literature with an introduction, a discussion of previous studies, relationship of previous behavioral studies to the current study and a summary.

Chapter IV describes the research methodology which includes research design, data collection, and testing procedures.

Chapter V reviews the criteria for accepting or rejecting each hypothesis, and presents the test results with appropriate interpretations.

Chapter VI presents a summary of the study, conclusions based on the results of the study, and suggestions for further research.
CHAPTER II

HISTORY AND DEVELOPMENT OF ACCOUNTING REGULATIONS
FOR OIL AND GAS PRODUCING ACTIVITIES

Since the mid 1950s the accounting profession, the oil and gas industry, financial analysts and various regulatory bodies have had differing opinions on proper accounting principles for oil and gas production, which includes exploration, development and production. Prior to the mid 1950s most oil and gas producers used successful efforts accounting that applied expenses and capitalization in differing ways. Costs incurred in searching for, acquiring, and developing oil and gas reserves were capitalized if reserves were found and expensed if no reserves were found. Some firms capitalized all geological and geophysical costs incurred on an exploration lease. Others divided the costs between acreage acquired, which were capitalized, and acreage not acquired which were expensed. Some firms expensed all dry-hole costs. Others capitalized dry-hole costs as part of total costs of reserves found. Others expensed exploratory dry-hole costs and capitalized development dry-hole costs. Some oil and gas producers expensed costs of undeveloped leases only when abandoned. Others amortized undeveloped lease costs over the term of
the lease. Others used valuation allowances to reduce the carrying value of undeveloped acreage tied to a predetermined percentage of cost. Successful efforts accounting principles prior to the mid 1950s were deficient in providing for comparability between oil and gas producing companies.¹

In the mid 1950s a new approach was introduced which was called the full-cost method. All costs incurred in exploration, acquisition and development of oil and gas reserves in a cost center are capitalized, regardless of the level of success of the drilling effort. Costs charged to the cost center also include costs of drilling dry holes, abandoned lease costs, delay rentals, overhead of the exploration department, exploration costs that do not locate areas of interest and property taxes on non-producing properties. These cost center capitalized costs are amortized and charged against reserves as they are produced. Full cost principles were also applied in differing ways. The firms' entire global oil and gas producing activities are considered one cost center. All production costs are capitalized in one figure no matter when or where costs were incurred or reserves were found. Others

¹Horace R. Brock, John P. Klingstedt, and Donald M. Jones, Accounting for Oil and Gas Producing Companies (Denton, Texas: Professional Development Institute, 1981), p. 55.
consider a continent or a country as a cost center. To prevent accumulation of asset costs exceeding the value of those assets, a ceiling is applied. This led to differing approaches to computing "value."\(^2\)

Other variations in both successful-efforts and full-costing accounting methods were summarized in FAS No. 19. Variations within both the full-cost method and the successful-efforts method exist in (a) the categories of reserves used in computing amortization, (b) whether future development costs are anticipated if capitalized acquisition, exploration or development costs are amortized on the basis of all proved reserves, (c) the extent to which properties are aggregated for amortization purposes, (d) the basis for determining amortization rates if oil and gas are jointly produced, (e) the categories of reserves and methods of valuation used in computing a limitation on capitalized costs, and (f) allocation of overhead.\(^3\)

By 1970 approximately half of the publicly traded oil and gas producing companies were using full-cost, but most of the larger companies were using successful-efforts.\(^4\)

The plethora of differing accounting methods being used made it very difficult to compare financial statements of oil and gas companies. In 1964 the Accounting Principles Board (APB) of the American Institute of Certified

\(^2\)Ibid., p. 56.


\(^4\)Brock, Klingstedt and Jones, p. 57.
Public Accountants commissioned Robert E. Field, a partner in Price Waterhouse and Company, to study accounting methods being used in the extractive industries. The Field study was published in 1969. It advocated elimination of the full-cost accounting method and recommended the use of only successful-efforts methods. The APB then appointed a committee to examine the Field report and to recommend adoption by the APB of an authoritative Opinion. The proposed APB opinion issued in 1971 which recommended uniform adoption of the successful-efforts method received such heavy objection from the advocates of the full-cost method that the proposed opinion was withdrawn. This proposed opinion was both controversial and unsuccessful to the extent that no further action had been taken when the APB was dismantled in 1973 and replaced by the Financial Accounting Standards Board (FASB).

The Arab oil embargo of 1973 stimulated public interest which resulted in the Energy Policy Conservation Act of 1975 (EPCA). The EPCA established the Department of Energy and directed the SEC to develop accounting practices for oil and gas producing companies in order to establish an adequate national energy data base. It also gave the

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The SEC the right to rely on the FASB to develop these accounting practices. The SEC required disclosure of quantities of proved reserves in annual filings of registrants in 1976. In late 1975 the FASB placed on its agenda a project entitled "Financial Accounting and Reporting in the Extractive Industries" which culminated in the issuance of FAS No. 19 entitled "Financial Accounting and Reporting by Oil and Gas Producing Companies" in December of 1977. It adopted a version of the successful-efforts method and listed certain supplemental data to be included in the financial reports of oil and gas producing companies either within the body of the financial statements, in the notes or in a separate schedule.

In August 1978 after holding public hearings, the SEC issued Accounting Series Release (ASR) No. 253 that concluded neither successful-efforts nor full-costing methods provided a meaningful presentation of efforts to find petroleum reserves or to reflect the major asset of oil and gas reserves. The SEC announced it would require disclosure of reserve "value" data and initiated a project seeking to include reserve values in balance sheets and income statements through a new method of accounting called reserve recognition accounting (RRA). Historical cost-based primary financial statements would employ the successful-efforts method or a full-cost method to be
prescribed by the SEC, but RRA statements were required to be included as supplemental data. The SEC felt the traditional accounting realization principle did not properly reflect income from oil and gas production. This was based on two reasons. The earnings process is significantly effected upon the impairment of existing reserves or the discovery of proved reserves. Also, oil and gas production is similar to agricultural products and precious metals where completion of production is the point of recognition, not the point of sale. However RRA is subject to manipulation of reserve values which would impact on net earnings, income tax expense and earnings per share. In the RRA framework revenues are sales and transfers of production plus current addition to proved reserves. Expenses are all current period costs of exploration and development of proved properties, and non-productive costs during the period. Revisions of previously reported proved reserves affect the RRA earnings summary. Current prices and costs are to be used except those provided by contractual agreements. The estimated future net revenues are

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7 George Walendowski and Michael A. Diamond, "RRA--Will It Work?" Management Accounting, 61 (March 1980), 23.
then discounted by a SEC required standardized ten percent rate, which the SEC determined would reflect both the general interest rate structure and risk. In December 1978 the SEC released its final rules for full costing and required disclosures outside the financial reports of estimated future net revenues from production of proved reserves. Also in December 1978 the SEC issued its final rules for successful efforts accounting which were essentially the same as those in FAS No. 19. It defined proved reserves as the estimated quantities of crude oil, natural gas and natural gas liquids which geological and engineering data demonstrate with reasonable certainty to be recoverable in the future from known reserves under existing conditions.

In ASR No. 253 the SEC required placing values on proved reserves as follows. Estimates are made in

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quantities expected to be produced for future periods on year-end conditions. Future revenue is determined by applying current prices adjusted only for fixed contractual escalations. Future gross revenue streams are reduced by estimated costs of development and production for each future year based on current costs. The net revenue streams in the future are discounted to present value using a ten percent discount factor.\(^{11}\)

In February 1979 the FASB issued FAS No. 25 that indefinitely suspended most of the provisions of FAS No. 19.\(^{12}\) Provisions of FAS No. 19 relating to deferred income taxes, mineral property conveyances and the disclosure requirements were retained and became effective for fiscal years ending after December 25, 1979. Thus companies under SEC jurisdiction may follow either full-costing or successful-efforts methods.

There is no prescribed method of accounting for costs incurred in oil and gas exploration or for amortization of these capitalized costs for companies not under the jurisdiction of the SEC.\(^{13}\)

\(^{11}\)Accounting Series Release-253.


\(^{13}\)Brock, Klingstedt and Jones, p. 59.
Disclosure requirements were amended to permit disclosures outside the financial statements of mineral reserve quantities, capitalized costs, costs incurred and other information. Mineral reserve quantities owned or those to which the company has contractual rights through mineral leases must be included for each year for which a complete set of financial statements is presented. Proved reserves under long-term supply agreements with foreign authorities in which the company acts as producer, and the company's interest in reserves of investees accounted for by the equity method must be shown separately. Also required are a reconciliation between beginning and ending quantities detailing revisions, improved recovery, purchase of minerals-in-place, additions, and sales of minerals-in-place, all by geographic area. Aggregate capitalized costs and related depreciation, depletion and amortization must be separately disclosed for mineral interest in both proved and unproved properties, wells and related equipment and facilities, support equipment and facilities, and incomplete wells and equipment and facilities. Capitalized cost information must be in both annual and interim statements, subject to normal audit requirements. Disclosure of costs incurred are required in annual statements, are subject to audit and includes both those capitalized costs and those charged to expense, categorized by function of property
acquisition, exploration, development and production
detailed by geographic area. Other information includes
explanation in narrative form, significant uncertainties
estimating reserve quantities, and disclosing the method
of accounting for costs as well as the manner of disposing
of capitalized costs related to those oil and gas
activities.14

In September 1979 the SEC required oil and gas
producers to include in their financial reports filed with
the SEC for fiscal years ending after December 25, 1979 a
supplemental summary of producing activities based on RRA
accounting. It also announced the SEC's intention to
require these disclosures to be made in annual reports to
security holders for fiscal years ending after December 25,
1980.15 In September 1980 the SEC required this supple-
mental oil and gas reserve information to be presented in
annual reports to security holders. In September 1980 the
SEC postponed the audit requirements for oil and gas
reserve information until years ending after December 25,

14Barry G. King and Horace R. Brock, "Financial Dis-
closures for Oil and Gas Producers," Oil and Gas Tax

15Securities and Exchange Commission, "Oil and Gas
Producers Supplemental Disclosures on the Basis of Reserve
Recognition Accounting," Releases Nos. 33-6126; 34-16218;
35-21222; IC-10875; AS-269 (Washington: Government Printing
Office, September 24, 1979).
In April 1980 the SEC amended Regulation S-K to postpone audit requirements for reserve information until a decision was reached on a uniform method of accounting in the primary financial statements. It permitted supplementary disclosures of reserve information until this determination is made.

In February 1981 the SEC announced that RRA had shortcomings that rendered it unappropriate for adoption as the primary basis for accounting for oil and gas producers. It referred this issue to the FASB to develop disclosure requirements for oil and gas producers, but not to involve determination of the appropriate historical cost method.

After public hearings and several drafts, the FASB on April 15, 1982 issued an exposure draft on "Disclosures about Oil and Gas Producing Activities" which was intended to supercede FASB Statements Nos. 19 and 25.

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1982 the SEC announced its intention to amend its require-
ments for supplementary oil and gas disclosures to require 
compliance with the FASB proposed disclosure require-
ments. These FASB requirements would apply to supple-
mentary information on publicly owned oil and gas 
producing companies. Capitalized costs are disclosed for 
proved and unproved properties with related accumulated 
depreciation, depletion, and amortization, and valuation 
allowance. The company's share of equity investee's net 
capitalized costs are stated separately. Costs incurred 
are stated by geographical area and total for property 
acquisition, exploration, development, production and 
enterprise's share of equity method investee's costs 
incurred in producing activities. Results of operation 
based on historical costs state, in total and for geograph-
ical area, revenues less production costs, exploration 
expenses, depreciation, depletion and amortization, and 
value provision, and income tax expense to determine 
operating profit or loss from producing activities excluding 
corporate overhead and financing costs. Also stated is the 
company's share of equity method investees' operating 

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19 Securities and Exchange Commission, "Supplemental 
Disclosures of Oil and Gas Producing Activities: Proposed 
Amendment of Rules," Releases Nos. 33-6412; 34-18837; 
35-22546; IC-12503; S7-936 (Washington: Government Printing 
Office, July 13, 1982).
profit or loss from producing activities determined in a similar manner. The proved oil and gas quantity schedule is essentially the same as previously required.

The standardized measure of discounted future net cash flows and changes therein relating to proved oil and gas reserves is comprised of two parts. The first part states, in total and by geographical area, future cash inflows less future production and development costs less future income tax expenses to determine future net cash flow which is discounted with a ten percent annual discount rate to calculate the standardized measure of discounted future net cash flows relating to proved oil and gas reserves. Current prices, current costs and current income tax regulations are used in making these calculations. The enterprise's share of equity method investee's standardized measure schedule is stated. The second part of the schedule is the reconciliation of beginning-of-year and end-of-year reserve values by total and by geographical area. The beginning-of-year value is adjusted by changes resulting from rates and transfers of oil and gas produced; net of production costs; net changes in prices, and development and production costs; extensions, discoveries, additions, and improved recovery less related costs; development costs incurred during the period; revisions of previous quantity estimates; net change in purchases and sales of minerals in place;
accretion of discount; net change in income taxes; and other.

This proposed statement requires all companies to report in their financial statements the accounting method for costs incurred in oil and gas producing activities but eliminates the requirement for nonpublic companies to report proved oil and gas reserves, capitalized costs and costs incurred.

The use of current cost information for nonrenewable natural resources is controversial. *Statement No. 39* recognizes that no generally accepted approach exists for measuring the current finding cost of oil and gas, but suggests that current cost may be measured by the estimated buying price or by the estimated cost of some other method of acquisition.20 Supporters of using current costs suggest that current cost provides information about capability to undertake the previous level of exploration activities because it covers the price change variable in finding costs. Opponents suggest current cost information about nonrenewable natural resources is much less representative than current cost of other assets.

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In addition to the issues of nonpublic company reporting and reporting on the basis of current costs, disclosure of undeveloped acreage has not been required in the financial reports.

A segment of opinion, not without justification, takes the view that significant variations of cost-based accounting should have been delayed until the FASB's conceptual framework project was completed.\(^\text{21}\) Cooper, et al. suggested that RRA was "essentially an arbitrary approach aimed at assuming a degree of uniformity in reporting during an experimental transitional period in which it is anticipated that an acceptable accounting and reporting framework can be developed."\(^\text{22}\) They pointed out that there are many risks associated with reserve estimates, reserve recovery and revenue realization that vary for different companies, across time for all companies and for a particular company. Some of these risks are quality of reserves, concentration of reserves, recoverability, changes in technology, political developments, changes in environmental consciousness, and location.\(^\text{23}\) These factors


\(^{22}\)Cooper, Flory, Grossman and Groth, p. 84.

\(^{23}\)Ibid., p. 86.
amplify the problems inherent in arbitrary discount rates and constant prices in calculating present value of the expected net revenues. The discount rate reflects the time value of money, the business risk, the financial risk and the risk of correct information. Using a constant discount rate assumes the risk of expected returns increases at a constant rate over time, which will not occur. The risk of production depends on the period in which it is produced. A constant discount rate lacks sensitivity to the changes in the elements of risk. The assumption of constant prices of oil and gas at current levels also distorts the usefulness of the present value method.

Cooper et al. note some of the effects of the interaction of discount rate and price on the present value computation as one or both vary. Errors in the discount rate have an asymmetric effect on the present value of reserves calculations. If the discount rate is constant, price change produces a constant percentage change in the present value. The price factor is in the numerator of the present value calculation and is effected differently than a change in the denominator. When changes occur both in price and discount rate, a partially offsetting effect occurs but not by a constant amount. This means using a discount rate different from the true discount rate, and using constant prices when prices fluctuate may result in
potentially misleading information on reserves.\textsuperscript{24} Thus a serious reporting problem exists in both RRA and the proposed new oil and gas producer reporting standards.

A possible solution to this problem is to use an approach similar to the net present value profile of capital investment analysis. Cooper, et al. suggest disclosing present value of estimated reserves for differing prices and differing discount rates with various prices on the abscissa and various discount rates on the ordinate.\textsuperscript{25} This would provide a range of possible net present values which would be more useful to knowledgeable investors than a single value estimate. However the proposed disclosures being considered in this study use current costs and current prices, and a single uniform discount rate of ten percent.

The proposed disclosures about oil and gas producing activities\textsuperscript{26} have a very similar quantity disclosure requirement to RRA. The capitalized costs disclosure eliminates reporting by geographical area and eliminates the categories of support facilities and incomplete construction as separate reporting items. The costs incurred disclosure eliminates separate listings by proved and

\textsuperscript{24}Ibid., p. 90.

\textsuperscript{25}Ibid.

\textsuperscript{26}FASB, "Disclosures about Oil and Gas Producing Activities," pp. 13-21.
unproved acreage for property acquisition costs, as well as a total costs incurred listing. The performance measure of changes in "value" was eliminated. A results of operation disclosure based on historical costs was proposed. This schedule shows revenues less production costs, exploration expenses, DDA and value provision, and income taxes to obtain operating profit or loss from producing activities excluding corporate overhead and financing costs. It proposes a standardized measure of discounted future net cash flows relating to proved oil and gas reserves, that includes discounting the expected future income tax expenses. This schedule then requires a reconciliation of beginning-of-year to end-of-year values.

The exposure draft was only slightly modified in the final issuance of the standard, FAS No. 69. The capitalized costs schedules remained unchanged. The costs incurred schedule was modified by deleting the line item called production costs, and required further detail of property acquisition costs by proved and unproved line items. The results of operations schedule was changed by expanding the revenues line item to detail sales and transfers which were totaled for revenues. The reserve quantity disclosure

remained unchanged. The first part of the standardized measure schedule remained unchanged. But the second part was changed from being a reconciliation type disclosure by geographical area to one stating item figures in total amount. The line items deleted were as follows: beginning of year; changes resulting from; net changes in purchases and sales of minerals in place; and end of year. Other minor changes were made.

The FASB and the SEC have made attempts to develop supplementary disclosures to assist users in assessing future net cash flows, estimating values of mineral reserves, and comparing operating results of companies in the industry. 28 However, the problem of not requiring a uniform method of accounting for costs incurred in oil and gas producing activities still renders historical cost-based financial statements deficient for assessing timing, amounts and uncertainty of expected net cash flows to the company. The question exists as to whether the FAS No. 69 disclosure requirements will help correct these deficiencies of the basic financial statements for oil and gas producers.

28 Ibid., p. 30.
CHAPTER III
ACCOUNTING AND EVALUATION:
REVIEW OF THE LITERATURE

Introduction
In April 1982, the Financial Standards Accounting Board (FASB) issued a Proposed Statement of Financial Accounting Standards, "Disclosures about Oil and Gas Producing Activities." This statement would require all publicly owned oil and gas producing enterprises to disclose capitalized costs, costs incurred, historical cost-based results of producing operations, oil and gas quantities of proved reserves, and a standardized measure of discounted future net cash flows from proved reserves. These disclosures do not include the SEC required RRA disclosure of an alternative measure of income. The FASB suggests the objective is comprehensive disclosures for oil and gas producing activities that are useful in making investment, credit, and similar decisions.¹

reaction to changes of accounting method relating to the oil and gas industry, and to supplemental disclosures of other accounting information. Research on the subjective nature of reserve quantity estimation, and on RRA and the proposed disclosures are also presented. The research design and conclusions of each study, and the implications of these studies on this dissertation are discussed.

Stock Price Reaction to a Change in Accounting Method--FC to SE

Prior to the moratorium called by ASR No. 253 (discussed earlier on page 25) on the debate of whether the full-costing (FC) or the successful-efforts (SE) method of accounting for oil and gas producers was preferable, several studies explored the market impact on the stock values of full-cost companies of an announcement to require the use of the successful-efforts costing method. These studies are relevant to this dissertation because they tested the impact of an announced (by exposure draft) change in accounting method on market valuation of the stock price for oil and gas producers using the full-cost method.

Patz and Boatsman\(^2\) studied stock price behavior of producing companies to determine the effect of eliminating

full-cost expensing. They reasoned if full-cost companies were required to report on a successful-efforts basis their earnings would be lower. They found no adverse effects on share prices at the time of the study.3

Baruch Lev conducted a study to determine the effect of proposed FAS No. 19 on the behavior of stock prices.4 Daily returns of individual firms were studied for seven trading days starting two days prior to the exposure draft release. Forty-nine full-cost and thirty-four successful-efforts firms were chosen from the list of oil and gas companies whose stocks were traded on the New York and American Stock Exchanges. Selection criteria applied were to include those companies with exploration activities; with accounting methods clearly stated; and with no announced earnings, dividends or stock dividends during the examination period. Daily closing stock prices were collected for seventy-eight trading days in three periods: the seven-day test period, forty-five days prior to it, and twenty-six days after it. Regression analysis using ordinary least squares was used for statistical testing. In the pre-announcement period the pattern of average

3Ibid., p. 402.

residual returns of the full-cost and the successful-efforts companies were very similar. This similarity breaks down during the test period. On the average and adjusted for market change, the stock price dropped four and one-half percent for full-cost stocks and one percent for successful-efforts stocks during the first three days after announcement. This impact was terminated after the third day, which is consistent with capital market efficiency. Stock prices continued their downward movement from days five to thirty, but this movement was more likely caused by information other than the exposure draft, such as a notice of Exxon's earnings decline reported in the post-announcement period. Results suggested a moderate response of stock prices to the release of the exposure draft. Lev concluded that the release of the exposure draft has a moderate effect on the capital market. It appeared the market did not anticipate the exposure draft content in a major way. He suggested no substantive economic effects would be expected from the proposed switch to successful-efforts accounting. Lev offered several possible answers to the problem of a downward price revision of full-cost stocks during the test period. For some full-cost firms, the change to successful-efforts might have had a real effect on debt covenant compliance, real impact on dividend policy, affect the scope of future
exploration, effects on incentive management compensation programs based on reported net income, and allow investor reaction to changes in numbers even when such changes are not associated with substantive economic effects.\textsuperscript{5}

Dyckman and Smith\textsuperscript{6} reported on a study undertaken to provide data on the information effect related to the issuance of FAS No. 19. They selected a first group of fifty-six companies heavily engaged in exploration activities, of which twenty-two were successful-efforts and thirty-four were full-cost. The second group consisted of one hundred nineteen companies with revenues less than one billion dollars, and these firms were not necessarily engaged primarily in exploration activities. All of the firms in the first group were also in the second group. The information effect was tested by market returns of these firms. They applied a research method used by James Patell.\textsuperscript{7} First they fit a simple, one variable regression model to the returns for each security for the estimation

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\textsuperscript{5}Ibid., pp. 502-503.


\end{flushleft}
period between October 8, 1976, and October 7, 1977. This
gave the security's estimated return as a function of the
market return, the difference being the residual. They
then used the regression equation for the estimated period
to determine each security's expected returns for the
seventeen weeks from October 14, 1977, to February 3, 1978,
which was called the test period. Residuals were deter-
mined with the expected returns and the actual returns for
the test period. A change in the return behavior from the
estimation to the test period allowed comparison of residual
behavior of the full-cost firms to those of the successful-
efforts firms to determine a selective effect which would
be evidence of an information effect due to the issuance of
FAS No. 19. The aggregate values for the test period for
the first group were negative, but those for the full-cost
firms were significant while those for the successful-
efforts group were not. The aggregate values of the two
subperiods were negative, and only the performance for the
full-cost firms for the period subsequent to the issuance
of FAS No. 19 was significant. Based on the aggregate mean
return behavior for the test period, neither sample
supported a differential effect of FAS No. 19 on the mean
returns of full-cost versus successful-efforts securities.
Testing for a change in the variances of returns based on
the average standardized squared residual by portfolio by
week did not support a finding of an increase in variance of returns in the test period compared to the estimation period. Thus they did not find a significant (at the .05 level) information effect from the issuance of FAS No. 19 over the seventeen week test period. This study used weekly data and included a number of firms traded on the over-the-counter market.

Collins and Dent performed a study similar to Dyckman and Smith's study, but excluded Canadian firms and excluded six of the firms included by Dyckman and Smith that were involved in mergers or acquisitions or liquidations during the test period. Collins and Dent also extended the time period studied to thirty-five weeks after and nine weeks before issuance of the exposure draft. They found a negative difference in the risk-adjusted rates of return between full-cost firms and successful-efforts firms which was associated with the proposal to eliminate full-cost accounting.

The issue tested in the Collins and Dent, the Dyckman and Smith, and the Lev studies is whether the accounting

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8Dyckman and Smith, pp. 275-276.

change to requiring only successful-efforts accounting would adversely affect the equilibrium values of the firm's equity securities. The conflicting results of the Collins and Dent, and the Dyckman and Smith studies might be due to differences in samples and statistical techniques used. Dyckman and Smith included sample Canadian firms listed on the U.S. exchanges while Collins and Dent did not. The reason for the exclusion was that most of these Canadian firms were involved in the new Pembina basin, which might have affected their stock behavior. Dyckman and Smith used parametric tests while Collins and Dent used nonparametric tests of significance given the cross-sectional dependence of the observations. Both of these studies were concerned with the permanency of price reaction to the accounting change. The Lev study tried to focus on the continuous nature of stock price reaction to new public information. Lev suggested the chronicle of events during the two week period surrounding the issuance of the exposure draft was probably responsible for the downward price movement that Collins and Dent observed. Lev applied a study of daily returns over a short period on the basis that a "signal to noise ratio" is larger for daily data than weekly data and can be more clearly identified.\footnote{Lev, pp. 487-489.} The Lev study suggests that after a three-day market
adjustment, no substantive economic effects were expected from an accounting change to require successful-efforts accounting.

Americ tested the idea that different accounting methods of full-costing and successful-efforts were justified only by different economic circumstances. His study of fifty-two of the largest oil and gas companies in the Canadian oil and gas industry found no evidence supporting the existence of economic differences between fixed-cost or successful-efforts companies. He found no relationship between the accounting method used and the size of the company. He found no relationship between the accounting method used and the company's exploration and development life cycle. He found no relationship between accounting method and the company's degree of vertical integration. He reasoned without economic justification for different accounting methods, there should not be two acceptable methods. Within the limitations of measurement validity, he concluded that economic differences apparently did not effect the choice of accounting methods.

In a symposium sponsored by Gulf Oil Corporation to discuss the many controversial issues of oil and gas

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12 Ibid., p. 35.
reporting and corporate financial reporting, Ijiri reported
the difference between profit from either the successful-
efforts or the fixed-cost methods disappears in the long
run. All investment eventually is expensed, but the path
and speed may differ. According to Ijiri the issue is
merely a matter of the timing of the better or worse
appearance in earlier years.\textsuperscript{13}

The Dyckman-Smith and Collins-Dent studies found con-
flicting results, but the Lev study did uncover a moderate
response of stock prices to the release of an exposure
draft during the first three days after the announcement.
This moderate response was in evidence after the third day.
It apparently took the market three days to recognize this
change in accounting method to requiring successful-efforts
expensing as a matter of the timing of the profit appear-
ance in earlier years. The relevance to this study is that
each study is trying to identify effects on valuation of
releasing exposure drafts. Also, the three day delay may
be indicative of a market delay in absorbing new infor-
mation such as the proposed disclosure requirements used in
this study.

\textsuperscript{13}Yuji Ijiri, "Oil and Gas Accounting--Turbulence in
1979), 20.
Some Accounting Information Effects on Valuation

Studies have been conducted on the informational effect on valuation of changes in accounting item data, income forecast disclosures, lease disclosures, disclosures of changing prices in addition to the previously reported studies on change of accounting method for oil and gas producers. Since this dissertation is concerned with the usefulness of proposed disclosure requirements for oil and gas producing activities for analysts' valuation procedures, research on the effects of these accounting informational items is presented only as a small representation of the available literature on the market impact of accounting information, other than oil and gas required disclosures. The focus of this dissertation is primarily the effect of proposed required oil and gas disclosure requirements on financial analysts' valuation of oil and gas producing activities, and not on the capital market effect due to changes in accounting information. However, these capital market effects do indicate the effects of additional information on valuation. The following studies represent some of the research which has been done in this area.

Gonedes, Dopuch and Penman studied the extent to which income forecast disclosure information conveys information pertinent to valuing firms and the extent to which
requiring income forecast disclosure is consistent with Pareto optimal allocations of resources.\textsuperscript{14} One hundred forty-eight firms were used to collect forecasted earnings per share. Earnings per share figures were adjusted for size effects (scaled). The firms were then divided into quartiles to determine four portfolios. A measure of information variable was computed for each firm. Four control portfolios were randomly selected to compare the distributions of the four quartile portfolios with the unconditional distribution of the stock returns. Risk adjustments were made by ranking individual securities within each portfolio by their beta. An equal-weighted portfolio return was determined for each portfolio for each of two-hundred forty days. Return differences were obtained by subtracting control portfolio returns from forecasted portfolio returns. These return differences were analyzed for significance. They found that income forecasts conveyed some information useful in establishing a firm's equilibrium values, but much of this information content of forecasted earnings could be related to extremely low forecasts.\textsuperscript{15} This study used a randomly selected sample to


\textsuperscript{15} Ibid., pp. 132-133.
show that positive results found from the sample were true of the universe. Such internal validity is integral to studies of the market impact of disclosure.

Gonedes found some support for the statement that special accounting items convey information useful in establishing a firm's equilibrium values. Results based upon the signs of their aggregated special items were consistent with the effects implied by special-item disclosure regulations. However, results based on grouping firms according to the type of disclosed special items suggests no information being conveyed by these special-item disclosures. The major attribute studied was a security's relative risk as defined in the two-parameter asset pricing model. Some examples of special accounting items were: material write-downs of inventories, receivables, or deferred research and development costs; provisions for loss on major long-term contracts or purchase commitments; and losses on disposition of assets or business segments. The results for signs of aggregated special items were consistent with no dependence between relative risk and the effects of information conveyed by special items.¹⁷


¹⁷Ibid., pp. 250-252.
Ro18 studied the effects of mandated lease disclosure on stock price behavior. This study attempted to determine the impact on security prices of a required disclosure of capitalized accounting data for noncapitalized financing leases. The mandatory disclosure included the present value (PV) of the minimum future lease commitment, the interest rate implicit in computing the PV, and the income effect if such leases were capitalized. Although Ro's conclusions were qualified because of a small sample, a lack of testing for homogeneity of control group firms, and sample firm selection criteria problems, several conclusions were drawn. Capitalized lease disclosures with income effects did significantly change the distribution of security returns. The observed price effect was less for those firms disclosing only PV data. The capitalized lease disclosure tended to have an adverse effect on the valuation of all firms studied, with the high-risk firms being more adversely affected.19

Bowman20 studied the impact of leases on risk using the capital asset pricing model. He focused on the debit


19Ibid., pp. 317-318.

equivalence of leases. He used a multiple regression model with accounting beta, debt-to-equity ratio, and lease-to-equity ratio as the independent variables and market risk as the dependent variable. After correcting for multicollinearity between the lease and leverage variables, he found leases made a significant contribution to the association test on market risk.²¹

Several studies have been undertaken on the usefulness of disclosure of changing prices information to users. These studies used similar respondents, methodology and concern for effects on value, which are central to this dissertation.

Tondkar studied the usefulness of supplementary disclosure data to financial analysts in the Dallas/Fort Worth and Houston areas.²² He attempted to determine if analysts would use the supplementary data required by FAS No. 33²³ in evaluating operating performance, ability to maintain

²¹Ibid., p. 253.


physical operating capability and the general purchasing power of financial capital. Questionnaires were prepared using two sample cases, one of which was designed to be more negatively affected by changing prices than the other. One group of analysts received the two sample cases containing only historical cost-based financial statements and ratios. The other group received the same information the first group received plus the supplementary disclosure information. Rankings by group one were considerably different from rankings of group two. The Mann-Whitney U-procedure was used to test the hypothesis. He concluded supplemental information based on changing prices influenced the evaluations made by group two analysts. Current cost data was used most frequently. Supplemental information was preferred for evaluating ability to maintain general purchasing power of financial capital.24

Dyckman25 studied differences in financial analysts' valuations when price-level adjusted information was reflected in the accounting reports. Questionnaires were sent to three randomly selected groups, all from the Financial Analysts Federation. Each analyst was to determine a stock price for two hypothetical companies having

24Ibid., pp. 92-94.
essentially the same structure. Three sets of financial reports were prepared for each company. One set was historical cost-based financial statements and ratios. The second was the information of the first set along with price-level adjusted financial statements and ratios. The third was only price-level adjusted financial statements and ratios. Subjects in each group received only one set of statements, in an attempt to control the learning factor when the same subject is used more than once in an experiment. Data were analyzed using the nonparametric statistical methods of the Contingency Coefficient and the Kruskal-Wallis One Way Analysis of Variance. He found that a low correlation existed between preference for an investment in the firm’s stock and its reporting method. He found that this preference declined as one moved in sequence from historical cost-based financial statements to historical cost statements with supplementary disclosures, to price-level adjusted statements. This provides some support that supplementary disclosures do effect preference for an investment.

Lambert studied differences in decisions of bank loan officers using basic financial statements and those

26Ibid., p. 13.

using basic financial statements plus supplementary data on general purchasing power statements. One hundred eighty-nine loan officers returned questionnaires from the two hundred ninety-three sent. The questionnaire involved evaluating a term loan request for two hypothetical cases. Data were analyzed by the nonparametric z-test to identify significant differences in personal characteristic of the two test groups, and a t-test to test the hypothesis. In this case each group received two cases. One group received Alpha company's five year historical cost-based financial statements and Beta company's five year price-level adjusted financial statements. The other group received this same information plus historical cost-based statements for Beta company. Homogeneity was tested using the evaluations of Alpha company by both groups, and it was concluded the samples were independent. Lambert concluded there was no significant difference in loan decisions based on both historical cost-based and price-level adjusted financial statements.28

The Tondkar, Dyckman and Lambert studies establish a precedent for the research design used in this study. All use questionnaires for data gathering. All are concerned with the usefulness of supplemental disclosure information by a professional group. All use two cases for comparison

28Ibid., p. 150.
of the usefulness of basic historical cost-based financial statement and historical cost-based financial statements plus supplemental disclosure data. All use nonparametric statistics for analyzing data and testing hypotheses. All are concerned with the behavioral aspect of determining values from financial accounting data.

The Gonedes-Dopuch-Penman study\textsuperscript{29} found some disclosure information useful in establishing a firm's value. Gonedes\textsuperscript{30} found some support that special accounting items convey information useful in determining a firm's value. Ro\textsuperscript{31} found capitalized lease disclosures to have an adverse effect on a firm's value. Tondkar\textsuperscript{32} found supplemental information on changing prices influenced analysts' evaluations of a firm. Dyckman\textsuperscript{33} found some support that supplementary disclosures do effect preference for an investment; but Lambert\textsuperscript{34} found no difference in bank loan officers' decisions based on financial statements or based on financial statements plus supplemental disclosures on purchasing power. These studies, as a group, provide

\textsuperscript{29}Gonedes, Dopuch, and Penman, pp. 89-133.

\textsuperscript{30}Gonedes, pp. 220-252.

\textsuperscript{31}Ro, pp. 315-337.

\textsuperscript{32}Tondkar, p. 3.

\textsuperscript{33}Dyckman, p. 4.

\textsuperscript{34}Lambert, p. 1.
evidence of a possible impact on valuation by disclosure information. This study was concerned with the effects of supplemental disclosures on analysts’ valuations of an oil and gas producing firm.

The Subjective Nature of Reserve Quantity Estimation

Valuation of oil and gas producing activities is critically related to the determination of proved reserves estimates. Estimates of the quantity of proved reserves provide the basis on which valuation of those reserves may be made. If the reserve quantity estimates are subjective to the extent that verifiability, reliability and comparability may not be achieved, it is an inescapable conclusion that values based on those estimates are subjective as well.

Stanley Porter conducted a study with the assistance of Arthur Young and Company on the subjectivity of reserve estimates and its relation to financial reporting. This study focuses on the inherently subjective nature of reserve estimates, which was commented upon by the Society of Petroleum Engineers as follows:

The reliability of Reserve Information is considerably affected by several factors. Initially, it should be noted that Reserve Information is

imprecise due to the inherent uncertainties in, and the limited nature of, the data base upon which the estimating and auditing of reserve information is predicated. Moreover, the methods and data used in estimating Reserve Information are often necessarily indirect or analogical in character rather than direct or deductive. Furthermore, the persons estimating and auditing Reserve Information are required, in applying generally accepted petroleum engineering and evaluating principles, to make numerous judgments based upon their educational background, professional training and professional experience. The extent and significance of the judgments to be made are, in themselves, sufficient to render reserve information inherently imprecise.\(^3^6\)

Porter's study used questionnaires to gather data from twenty-six individual companies that represented fifty-four percent of the 1978 crude oil and natural gas liquids production and fifty percent of the 1978 gas production in the United States. Field information was gathered from twenty-two companies in twenty-two states which included three hundred eighty properties for a period of six years. Inter-company comparisons were made of nineteen companies representing twenty-eight properties. Analysis of proved reserve estimates of fields over a period of time focused on revisions in prior estimates of quantity on an annual basis. Analysis was made of differences between estimates of proved reserves made by two or more reserve estimators.

using a common data base. The impact of subjectivity was determined by measuring the effects of subsequent revisions in prior estimates of proved reserves. These revisions reflected the results of improved knowledge and indicated the effect adjustments of one period modify or cast doubts upon the estimates of prior periods. Porter concluded reserve estimates do not possess the qualitative characteristics of verifiability, reliability and comparability that are necessary for the preparation of financial statements based upon changes in reserve quantities, or for the preparation of statements of value. The subjectivity of the estimate of proved reserves is important to this study because both the reserve quantity disclosure and the standardized measure disclosures (see Appendix C) are determined by using estimates of proved reserves.

Behavioral Studies on RRA and Proposed Disclosures

The SEC determined that the limitations of the successful-efforts and the full-cost accounting methods established a need for supplementary disclosures of oil and gas producing activities. They then required disclosure of capitalized costs, costs incurred, proved oil and gas quantities, and reserve recognition accounting (RRA) which included a summary statement and a reconciliation.
statement. RRA was the predecessor of the proposed disclosure requirements for oil and gas producers. A review of behavioral studies conducted on RRA disclosures is material to this dissertation.

Adkerson suggested the success of oil and gas producing activities depends on discoveries in relation to costs incurred in finding, developing and producing oil and gas. 38 The determination of recovery of invested costs is complicated by the subjectivity of estimating recoverable quantities of oil and gas with reasonable certainty and timing accuracy. Measuring the economic profitability by associating specific costs with discoveries is very complex. 39 The need for supplemental disclosures on oil and gas reserves and operations exists because of the limitations of the successful-efforts and full-cost accounting methods. 40 The FASB itself recognized this problem in stating:

Neither full costing nor successful efforts costing reflects success at the time of discovery. Under both methods, success is reported at the

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38 Richard C. Adkerson, "Can Reserve Recognition Accounting Work?" The Journal of Accounting, 148 (September 1979), 73.


40 Adkerson, p. 75.
time of sale. It might be said, therefore, that both methods tend to obscure, or at least delay, the reporting of success, but that is the consequence of the historical cost basis of accounting, and its adherence to the realization concept.  

Adkerson suggested that the RRA method provided a relatively objective and uniform approach in the pricing and discounting of future net reserve streams from estimated production of proven reserves, but it did not indicate fair market value. Conner expressed concern that the SEC's method represented a radical departure from the basic accounting model, and that RRA should be tested before requiring publication in financial statements of petroleum companies. He expressed this position even though he advocated a concept of discovery value accounting in an earlier article.

Connor reported on a study by Price Waterhouse & Co. in 1979 of nine petroleum industry companies over a six

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42 Adkerson, p. 75.  
43 Joseph E. Connor, "Reserve Recognition Accounting: Fact or Fiction?" The Journal of Accounting, 148 (September 1979), 92.  
44 Joseph E. Connor, "Discovery Value--The Oil Industry's Untried Method," The Journal of Accounting, 139 (May 1979), 55.
month period.\textsuperscript{45} RRA earnings summaries with computerized effects of variation were analyzed. Detailed interviews were held concerning the theoretical foundation and implementation problems of RRA. Historical income was compared with RRA income. The companies represented a cross section of oil and gas producers in terms of size, geographic diversity and degree of integration. DeGolyer and MacNaughton advised the study on reserve determinations. The Study found RRA income differing significantly and erratically with historical income. Discovery date estimates were highly inaccurate. Reserve quantity estimation inaccuracies had a material effect on RRA income projections. Aggregate valuation changes from revisions were much greater than valuations initially placed on discoveries. Price change revisions greatly exceeded income from discoveries. RRA produced misleading estimation of future cash flows and unrealistic discovery losses. Estimates of development costs and production timing were often significantly inaccurate. He reported the following conclusions. The inherent imprecision of initial estimates of reserves and future development and production activities critically impaired the theoretical basis of RRA. The fundamental flaws of RRA subject the meaningfulness of reported RRA

\textsuperscript{45} Connor, "Reserve Recognition Accounting: Fact or Fiction?" pp. 92-99.
information to be somewhat suspect.\textsuperscript{46}

Ijiri suggested if a disturbance created by a disclosure is not justified relative to the reliability of the information, then the disclosure should be either prohibited or not required.\textsuperscript{47}

In August 1979 Peat, Marwick, Mitchell & Co. conducted a mail survey of three hundred sixty members of the National Association of Petroleum Investment Analysts, to determine analysts' comments on the usefulness of certain reserve quantity information and of estimated future net reserves from proved oil and gas reserves as suggested by RRA.\textsuperscript{48} They also asked about the desirability of requiring audit of these supplementary disclosures by independent auditors and engineers and if this would increase its value to them. Analysts were asked their opinion on whether or not they favored substitution of RRA for historical cost information. One hundred twenty-seven responses were received. The results were analyzed by determining the number of yes answers and the percentage of yes answers to

\textsuperscript{46}Ibid., p. 94.

\textsuperscript{47}Ijiri, p. 25.

total possible yes answers for each question. The major conclusions drawn from the survey were as follows. Analysts found the disclosures of reserve quantities and values useful. They thought an audit would not significantly increase the value of that information. Analysts would not substitute RRA for historical cost information of the basic financial statements.

King reported the results of a study of 128 oil and gas producers. He tried to determine how well each of the four disclosure schedules of RRA might meet user needs. King found the degree of subjectivity inherent in estimating reserves was not enough to render them misleading or lacking in usefulness. In comparing beginning net assets and ending net assets, and determining value per share using historical cost, present value and market value, he concluded the following. Present value asset values appear to more closely approximate mean market values than do historical cost measures. King found that the RRA Summary did not usefully and accurately reflect the operating activity of oil and gas producers. He also concluded that reconciliation of net present values provided little information not contained elsewhere, but qualified this by calling for disclosures where changes in price and other revisions were

significant. He found the costs incurred schedule of RRA disclosure by acquisition, exploration, development and production to be relevant and objective. He recognized severe limitations on generalizing from the results of this study because of the sample size, but suggested the study provided reasonable insights into the nature of the data being analyzed.50

In a 1981 study by Avard51 for the Extractive Industries Accounting Research Institute of North Texas State University, personal interviews with twenty-five members of the National Association of Petroleum Investment Analysts were conducted in New York, Boston, Houston, Dallas and Los Angeles. Although this study was a subjective evaluation of knowledgeable users, and had statistical limitations, several conclusions were considered relevant. The analysts unanimously endorsed the required disclosure of reserve quantities by geographic area. Value-based disclosures of proved reserves were favored by a slight majority of respondents, but no clear consensus of defining value emerged from the study. Generally, in determining value, quantities of proved reserves disclosed by the

50Ibid., p. 125.
company were reduced over time by a hypothetical decline curve. An escalation factor was applied to current prices. Future cost escalation was estimated and the expected net revenue was discounted by a predetermined rate or range of rates. Most respondents agreed the proper method for valuation of reserves was the discounted present value of future net cash flows based on estimated future prices and estimated future costs assumptions. Other analysts derived reserve value by multiplying the estimate of reserves by some arbitrary "standard" value, such as one-third of the difference between the current market price for a barrel of oil and the estimated windfall profit tax. This study found that value represented by RRA using current price and cost assumptions was considered by analysts as having little economic meaning. This problem also rendered the RRA measure of performance based on changes in value of proved reserves to have little meaning. Analysts felt a more realistic measure of results from exploration and production activities would be useful in evaluating the activities of integrated oil and gas companies.  

Deakin and Deitrick surveyed financial analysts of the Financial Analysts Federation who specialized in oil

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52 Ibid., p. 75.

and gas activities. They obtained a twenty percent response rate from their questionnaires and analyzed question response by percentage of yes and no answers to total responses received for each question. Although this study also had statistical limitations, they found analysts favoring disclosure of value estimates. Analysts favored uniform discounting assumptions and disclosures of reserve values for proved and probable reserves, but rejected reserve value disclosures for all reserves including unexplored acreage. They found that analysts preferred disclosure of the causes for changes in reserve value identified with the dollar value of each item causing the change, and reconciled from beginning to year-end values. Analysts favored the successful-efforts method over full-costing or RRA methods. They concluded their findings provided evidence supporting the continued disclosure of supplemental RRA information.54

Avard, in a 1982 study for the Extractive Industries Accounting Research Institute, attempted to determine analysts' opinions of the usefulness of the new proposed disclosure requirements for oil and gas producers.55

54 Ibid., p. 69.

Questionnaires were sent to the members of the National Association of Petroleum Investment Analysts. The questionnaire presented examples of currently required SEC disclosures along with corresponding proposed disclosures for each of the following schedules: capitalized costs, costs incurred, results of operations, proved oil and gas quantities, present value and changes therein, RRA results of operations and general considerations. Questions followed each area of disclosure. Responses were indicated by a one through seven preference type scale. Results for each question were analyzed using data grouped sample mean and standard deviation, along with consideration of data dispersion. Analysts considered useful the schedules of capitalized costs, costs incurred, historical cost-based results of operations, and proved oil and gas reserve quantities. They slightly agreed on the usefulness of disclosure of value of proved reserves, but the large standard deviation and wide dispersion rendered this inconclusive. Analysts registered a no opinion to the usefulness of RRA results of operation schedule, but the results here were also inconclusive. Avard recognized severe limitations in generalizing from the results of this study because of the small sample size of seven and seven-tenths percent responses from the population considered.56

56 Ibid., p. 131.
Behavioral studies on RRA and the proposed disclosures focus on the need for supplemental disclosures of oil and gas producing firms because of the limitations of the successful-efforts and full-costing accounting methods, because RRA did not indicate fair market value, and because of the subjectivity of reserve quantity estimation. Several of these studies involved using questionnaires to determine the usefulness of various disclosures. It appears that analysts considered the following disclosures useful: capitalized costs, costs incurred, historical cost-based results of operations, and proved oil and gas reserve quantities. Acceptance of a schedule of net present value of reserves was less clear because of the concerns of using current costs and current prices to determine their value. However, several of these studies were merely opinion surveys that did not employ sufficient empirical testing to analyze results adequately, but they are relevant because the supplementary information used in them is very similar to the five disclosure schedules tested in this study.

**Summary**

A number of empirical studies have used stock price behavior to determine the impact of new accounting information. This dissertation examined the effect supplementary
disclosures have on analysts' valuation of an oil and gas producing company. Several of the studies reviewed attempted to determine the effect on stock prices of an exposure draft announcing a change in accounting method. Other studies presented attempted to determine the effect on stock prices of accounting disclosures such as income forecast disclosures, lease disclosures and disclosures of changing prices. These studies indicated additional accounting information did effect stock prices. A study on the subjective nature of reserve quantity estimates emphasizes the subjective nature of a schedule of reserve assets, in dollars, which is one of the supplemental disclosures tested in this dissertation. Behavioral studies on RRA and the proposed disclosures present a brief review of studies on analysts' opinions of the usefulness of these schedules. These studies were relevant to this dissertation because the schedules tested were similar to those tested in this study. The relationships of each of the research studies to this dissertation were presented in this Chapter. This Chapter provides a foundation of understanding on which the research methodologies presented in Chapter IV were developed.
CHAPTER IV

RESEARCH METHODOLOGY

Introduction

This chapter presents a detailed description of the research procedures used to determine the effect of supplemental disclosures on analysts' estimates of value and on the method of valuation used. It also presents methods of analysis for testing the usefulness of ratios and information items, and for determining the usefulness of the schedules of the supplemental disclosures.

Rhode stated that accounting has developed with assistance from the disciplines of economics, law and statistical methods, and that a realistic examination of the validity of accounting practice and theory may best be made by reliance on the behavioral science.¹ Sterling stated "the effect of financial statements is an appropriate research question."² Beaver suggested research into external reporting issues


must include research into the relationship between accounting data and security price. He suggested since security price partially determines wealth, it is inconceivable that optimal information sets for users can be provided by accounting without a knowledge of how accounting data are impounded in security price.

In behavioral studies in accounting, behavioral patterns of users of accounting data in a decision process are observed and analyzed. Accounting performs a service of providing information to society. Behavioral experiments help identify the attitudes and behavioral patterns of varied user groups. This in turn should provide input into the decision process of modifying accounting information to better meet the needs of user groups.

A sample of financial analysts in the Dallas/Fort Worth, Houston and Oklahoma regions were personally

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4Ibid., p. 29.


interviewed by using questionnaires to make determinations of stock valuation for two cases, one with basic financial statements (Case I) and the other with basic financial statements plus proposed supplementary disclosures (Case II). The primary objectives of this study were to determine whether the proposed supplemental disclosure requirements for oil and gas producers would be used in the valuation processes of financial analysts, and if these disclosures would cause analysts to use a different method of analysis for Case II than was used for Case I.

Sample Selection

Financial analysts were chosen as respondents for this study because use of the proposed supplementary oil and gas disclosures requires a high level of sophistication with financial information on oil and gas producing activities. Analysts in the Dallas/Fort Worth, Houston and Oklahoma regions were chosen as the user group because of their proximity to the "oil patch" and their assessability for gathering data. The names and addresses of these analysts were obtained from the 453 analysts listed in the thirty-fourth edition of the Membership Directory of the Financial Analysts Federation. Each analyst's name was

consecutively numbered. A table of random numbers\textsuperscript{8} was used to determine fourteen analysts to interview in each of the three regions. Randomization assigns objects of a universe to subsets of the universe in such a way that every number has an equal probability of being chosen for that assignment.\textsuperscript{9} Twenty names were chosen randomly for each region. The first fourteen were expected to be interviewed for questionnaire completion. However, due to scheduling and availability considerations, any member of the original fourteen unable to complete the questionnaire was replaced in consecutive order from the randomized list of twenty for that region.

It is difficult to determine when a sample size is large enough that individual personality differences of respondents can be ignored because of their insignificant effects on experimental bias. With no control group, the effects of individual differences became insignificant in sample groups greater than ten subjects.\textsuperscript{10} The use of forty-two subjects in this study should preclude any difficulties caused by the effects of individual differences.


\textsuperscript{10}Rhode, p. 125.
In a behavioral study such as this one, a dilemma presents itself in the trade-off between the problem of homogeneity in group selection and the learning effect of using a single group with similar testing instruments. A problem of homogeneity would be introduced if Case I were given to one group and Case II to another group of analysts. A possible learning effect is introduced when one respondent is given both Case I and Case II, where Case II is Case I plus supplementary disclosures. A problem of homogeneity would seriously distort the results of the study. A problem of learning effect would tend to strengthen support for the hypothesis in this study if in fact a significant difference in valuation occurs for Case II, than for Case I. This occurs because the learning would be occasioned by the use of the supplementary disclosures for which we are trying to determine usefulness. The possible learning effect was lessened by the interview procedure of giving the respondent Case I for completion and return. Then Case II was presented for completion and return, with the stated request that references and notes on Case I should be disregarded in determining Case II valuations. In order to avoid the possible problem of inter-group collaboration, analysts in the same firm were interviewed in immediate succession on the same day.
Questionnaire and Pretesting

Hypotheses concerning the activities of individuals must eventually be tested by analyzing the behavior of real life subjects.\(^{11}\) However, the increase in realism is accompanied by a decrease in experimental control.\(^{12}\) This decrease in experimental control is compounded by using mail questionnaires which have the potential weaknesses of lack of response and inability to check the responses given.\(^{13}\) This study used a personal interview for respondents' completion of the interview form in order to strengthen experimental control.

The interview form was developed from the criteria of question-writing as presented by Kerlinger.

1. Is the type of question right and appropriate?
2. Is the question related to the research problem and the research objectives?
3. Is the item clear and unambiguous?
4. Is the question a leading question?
5. Does the question demand knowledge and information that the respondent does not have?
6. Does the question demand personal or delicate material that the respondent may resist?
7. Is the question loaded with social desirability?\(^{14}\)

The use of printed questionnaires evolved to overcome the interviewer bias problem of a personal interview.

\(^{11}\)Ibid., p. 123.
\(^{12}\)Ibid., p. 238.
\(^{13}\)Kerlinger, p. 414.
\(^{14}\)Ibid., pp. 485-486.
Rhode found the response rate to mailed questionnaires seldom averaged over sixty percent in 1971.¹⁵ The author's experience a decade later suggests response rates seldom average over twenty percent. In addition to the response rate problem, a question may have different meanings for different individuals. The use of a pretested questionnaire, given to the respondent in a personal interview, provides for a greater response rate,¹⁶ and allows for immediate and consistent clarification of questions. The interviewer bias problem was reduced by the interviewer providing only clarification of questions asked in the interview questionnaire.

The two basic properties of empirical measurement are reliability and validity. Reliability concerns the extent to which the questionnaire yields the same results on repeated trials.¹⁷ Content validity and criterion-related validity are concerned with the measure covering the domain of the theoretical concept and abstract theoretical concepts, but are imprecise standards with which to evaluate the validity of empirical measurements. Construct

¹⁵Rhode, p. 126.


validation focuses on the extent to which a measure performs in accordance with theoretical expectations.\textsuperscript{18}

Pretesting the interview questionnaire provided some assurance of the reliability and validity of the measurement process\textsuperscript{19} employed in this study. The interview form was pretested by faculty and doctoral graduate students of the finance and accounting departments of North Texas State University and two certified financial analysts in the Dallas area. After completion of the interview questionnaire, the participants were requested to suggest any improvements in the form for greater clarity. The interview questionnaire was modified to reflect the suggestions for improvement.

Interview Process

Letters generally explaining this research and requesting cooperation in arranging and allowing a personal interview were sent to twenty analysts in each of the three areas. These letters were sent on stationery of the Extractive Industries Accounting Research Institute of North Texas State University. Attached to this letter of introduction was a letter signed by Dr. Michael Walker, Chairman of the Department of Finance of North Texas State University.\textsuperscript{18}

\textsuperscript{18}Ibid., p. 27.

University, endorsing this research and encouraging participation in it. See Appendix D for sample copies of these letters.

Letters were followed with telephone contact to make an appointment with the analyst for a personal interview. These interviews were conducted during February, March and April of 1983. During the interview the analyst was handed Case I for completion. Case I was completed and returned to the interviewer. Then Case II was handed to the analyst for completion and return to the interviewer. The interviewer answered only those questions of respondents pertaining to clarification of the questions in the printed questionnaire.

Description of Cases

Two cases were prepared of an oil and gas producing enterprise. Case I included the following (see Appendix B):

1. two years of comparative historical cost-based financial statements including balance sheets, income statements and statements of changes in financial position,

2. five years of relevant historical financial ratios, exploration information, S&P indices and industry indices,

3. an interview form with questions to be answered concerning determination of an expected stock
price; identifying the method of analysis used, along with pertinent assumptions stated, as net present value, relative value, asset valuation, any other method or combination of these; and whether financial statements were used, which financial ratios were used, and specifying any other information used or desired.

Case II included the following (see Appendix C)

1. two years of comparative historical cost-based financial statements (identical to Case I),

2. five years of relevant historical financial ratios, exploration information, S&P indices and industry indices (identical to Case I),

3. supplementary disclosure information of capitalized costs, costs incurred, results of operations based on historical cost, proved oil and gas quantities, and the standardized measure of discounted future net cash flows,

4. an interview form with questions to be answered concerning determination of an expected stock price; identifying the method of analysis used, along with pertinent assumptions stated, as net present value, relative value, asset valuation, any other method or combination of these; and whether financial statements were used, which
financial ratios were used, which supplemental disclosure schedules were used, and specifying any other information used or desired.

Hypotheses

The primary objectives of this study were to determine whether proposed supplemental disclosure information will cause a change in value estimate and/or will cause a change in valuation method; and to determine which type of information will be most frequently used. The results of hypothesis testing provided the basis for validating theoretical statements concerning the nature and consequences of accounting practices. In order to accomplish the objective of determining a change in value, the following research hypothesis (number I) was designed:

There is no difference in financial analysts' valuation of an oil and gas producing company using only basic financial statements and valuation using basic financial statements plus supplementary disclosures.

This research hypothesis was subdivided into the following statistical null hypotheses ($H_0$s) and alternative hypotheses ($H_1$s):

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1. $H_{1O}$: There is no statistically significant difference between stock valuation of Case I and stock valuation of Case II, using the constant period net present value methods.

$H_{11}$: There is a statistically significant difference between stock valuations of Case I and stock valuations of Case II, using the constant period net present value methods.

2. $H_{2O}$: There is no statistically significant difference between stock valuations of Case I and stock valuations of Case II, using relative value analysis methods.

$H_{21}$: There is a statistically significant difference between stock valuations of Case I and stock valuations of Case II, using relative value analysis methods.

3. $H_{3O}$: There is no statistically significant difference between stock valuations of Case I and stock valuations of Case II, using asset valuation analysis methods.

$H_{31}$: There is a statistically significant difference between stock valuations of Case I and stock valuations of Case II, using asset valuation analysis methods.
In order to accomplish the objective of determining whether proposed supplemental disclosure information caused a change in valuation method, the following research hypothesis (number II) was designed:

Supplemental disclosure information, which was presented only in Case II, does not cause analysts using one method of valuation for Case I to switch to a different method of valuation for Case II.

Determinations were made on the usefulness of ratio and price information, the preference for each of the five supplemental disclosure schedules, and the frequency of the use of supplemental disclosures reported by valuation method.

Statistical Testing

It was expected that an analysis, similar to that used by Mukherjee and Austin,\textsuperscript{21} of mean, median, standard deviation, skewness coefficient and kurtosis coefficient for both Case I and Case II would demonstrate that the samples do not appear to have come from normally-distributed populations. Also it was expected that the differences in variance would suggest that the assumption of homoscedasticity was not present. A lack of homoscedasticity would make the application of parametric tests very questionable.

The Mann-Whitney U Test is a powerful nonparametric test. It is an alternative to the t test without the limiting assumptions of the t test. The Mann-Whitney U Test is a rank test which is valid for all types of populations whether continuous, discrete or mixtures of both. The test procedure is designed to test the hypothesis that two populations are the same, makes no assumption about the underlying population distribution and requires only that the observations can be ranked by some criterion, such as expected stock value. When the samples are ordinal-type data, the main interest is the difference in locations of the two populations.

The samples used in this study conform with the assumptions for applying the Mann-Whitney U Test. Samples for Case I and Case II were randomly selected from the Financial Analysts Federation members in the Dallas/Fort Worth, Houston and Oklahoma regions. There was mutual independence between Case I and Case II analysts because Case I and Case II were analyzed separately. Analysts had no opportunity to discuss the case with each other, thus


23Emory, p. 393.

maintaining independence within the sample. The measurement scale of expected stock value was at least ordinal.

Thus, the Mann-Whitney U Test was appropriate for determining whether a change in value occurs between Case I and Case II for each of the four stated hypotheses relating to changes in value. Statistical testing for changes in value was called research procedure No. I in this study.

The Mann-Whitney U Test is applied to determine whether the two populations, Case I and Case II, have the same distribution. The two samples are combined into a single ordered sample and ranked from smallest to largest values adjusting for ties. The test statistic is the sum of the ranks assigned to values from one of the populations. If the sum of the ranks were too small, using a .05 significance level, there would be some indication values from that population tended to be smaller than values from the other population. Thus the null hypothesis of no difference between populations could be rejected.25 The null hypotheses in this study state that Case I and Case II populations have the same distribution.

Research procedure No. I involved computing the Mann-Whitney U value on the basis of the stock valuations obtained. All observations were treated in a combined

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fashion and algebraically ranked from smallest to largest with ties assigned the average rank. The rank values for each sample were totalled and the U statistic was computed as follows:

\[ U = n_1n_2 + \frac{n_1(n_1 + 1)}{2} - R_1 \]

or \[ U = n_1n_2 + \frac{n_2(n_2 + 1)}{2} - R_2 \]

where: 
- \( n_1 \) = number in sample 1.
- \( n_2 \) = number in sample 2.
- \( R_1 \) = sum of ranks in sample 1.
- \( R_2 \) = sum of ranks in sample 2.\(^{26}\)

For testing purposes the smaller U value was used to evaluate the null hypothesis by referring to the appropriate tables. This procedure is appropriate for sample sizes up to twenty.\(^{27}\) As the sample size increases, the sampling distribution of U rapidly approaches normal distribution with a mean of:

\[ U = \frac{n_1(n_1 + n_2 + 1)}{2} \]

\(^{26}\)Emory, pp. 393-394.

\(^{27}\)Conover, p. 452.
and a standard deviation of:

$$U = \sqrt{\frac{(n_1)(n_2)(n_1 + n_2 + 1)}{12}}$$

and a standardized normal deviate:

$$Z = \frac{(U_1 - U_x) - 1/2}{U_1}$$

The 1/2 represents an adjustment for continuity because this is approximating a discrete distribution for $U_1$ by the continuous normal distribution.\(^{28}\)

When a sample size is greater than twenty, the sampling distribution of $U$ approaches the normal distribution\(^{29}\) with a mean of:

$$\mu_U = \frac{n_1n_2}{2}$$

and a standard deviation of:

$$\sigma_U = \sqrt{\frac{(n_1)(n_2)(n_1 + n_2 + 1)}{12}}$$

and the significance of an observed $U$ is determined as follows:

\(^{28}\)Spurr and Bonini, p. 322.

\(^{29}\)Emory, p. 395.
\[ Z = \frac{U - \mu_u}{\sqrt{\frac{n_1 n_2}{2}}} \]

\[ \sqrt{\frac{(n_1)(n_2)(n_1 + n_2 + 1)}{12}} \]

A correction factor for tied scores must be used when many tied scores are expected. The correction factor is \( \sum T \) which is the summation of values of \( \frac{t^3 - t}{12} \) (where \( t \) = tied scores). The formula for the standardized normal deviate then becomes as follows:

\[ Z = \frac{U - \frac{n_1 n_2}{2}}{\sqrt{\left[ \frac{n_1 n_2}{N(N-1)} \right] \left[ \frac{N^3 - N}{12} - \sum T \right]}} \]

where: \( N = \) number of observations in the experiment. 30

The Statistical Package for the Social Sciences (SPSS) 31 was used to test each null hypothesis at the five one-hundredths rejection level (95% confidence level). Each valuation method was evaluated by stating the mean relative ranking, the \( U \) statistic, and \( Z \) values and the two-tailed probability level which were corrected for ties.

30 Siegel, p. 116.

Summary information was provided concerning the number of analysts using each of the valuation methods, and frequency distributions of expected stock price within each valuation method.

Research procedure No. II involved applying the chi-square test of independence for two sample distributions to test for changes in valuation methods from valuing Case I to valuing Case II. The chi-square test determined only whether the distributions were independent or systematically related. The Cramer's $\chi$ was used to test for the strength of relationship.

The chi-square test of statistical significance was accomplished by computing the cell frequencies expected if no relationship existed and comparing these values with the actual values found by the following formula:\(^{32}\)

$$X^2 = \sum_{i} \frac{(f_{oi} - f_{ei})^2}{f_{ei}}$$

where: $f_{oi} =$ the observed frequency for each cell

$\sum_{i} f_{ei} =$ the expected frequency formed by

$$\frac{c_{ir_i}}{N}$$

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where \( c_i \) = the frequency in a respective column marginal
\( r_i \) = the frequency in a respective row marginal
\( N \) = the total number of valid cases

The calculated chi-square value was compared to the critical value from the table of critical values of chi-square with the same degrees of freedom and at the same level of significance. The null hypothesis was rejected if the calculated value was greater than the critical value.

The Cramer's \( V \) statistic is a suitable measure of the strength of the association and was calculated with the following formula:\(^{33}\)

\[
V = \left( \frac{\phi^2}{\min (r-1, c-1)} \right)^{\frac{1}{2}}
\]

where \( \phi = \left( \frac{\chi^2}{N} \right)^{\frac{1}{2}} \)

\( V \) ranges from 0 to +1 with a high value signifying a high degree of association, without revealing the manner of the association. An analysis of the proportion of analysts using a valuation method for Case I, to the proportion of analysts using that same method for Case II determines the manner of the association.

\(^{33}\)Ibid., pp. 224-225.
Research procedure No. III involved applying the test of differences between two proportions for items of information. The information provided for both Cases included eighteen items consisting of ratios, indices and some production information. Six of the most frequently used items were individually evaluated to test the differences between the proportions for Case I and the proportions of Case II. The formulas used for this test are as follows:

\[ P_1 = \frac{X_1}{N_1} \quad \quad P_2 = \frac{X_2}{N_2} \]

\[ \bar{P} = \frac{N_1 P_1 + N_2 P_2}{N_1 + N_2} \]

\[ \sqrt{\frac{\bar{P}(1-\bar{P})}{N_1 N_2}} \]

\[ Z = \frac{P_1 - P_2}{\sqrt{\frac{\bar{P}(1-\bar{P})}{N_1 N_2}}} \]

where: 

\( X_1 = \) number of analysts using this item for Case I

\( X_2 = \) number of analysts using this item for Case II

\[ N_1 = \text{total number of analysts valuing Case I} \]
\[ N_2 = \text{total number of analysts valuing Case II} \]

Testing the differences between two proportions resulted in a probability that the spread occurred by chance alone. A large probability indicated acceptance of the null hypothesis of no difference between the proportions.

Additional evaluation involved applying present responses to total responses for each of the five schedules of the supplemental disclosures. Each supplementary disclosure schedule represented in Case II was evaluated by the percent of analysts finding the schedule useful to total responses to Case II. This provided a determination of which schedules the analysts considered as more useful than others in making their valuations of Case II. Also, a determination was made concerning whether the analysts using any one method preferred the supplemental disclosure more than those using other methods.

Summary

In this chapter the sample selection was explained, questionnaire preparation and pretesting were discussed, and the cases were described. Research hypotheses were stated for testing for changes in valuation and for switching valuation method. Statistical testing for changes in valuation using the Mann-Whitney U test, and for
switching valuation methods using the chi-square and Cramer's \( V \) tests were discussed. Testing the differences in responses to the usefulness of items of information provided for both Cases was stated. Determining the perceived usefulness of the schedules of the supplemental disclosures was also discussed. The test results are presented in Chapter V.
CHAPTER V

RESULTS OF THE STUDY

Introduction

The first section of this chapter briefly discusses the data collection procedures used. The second section presents the results of statistical testing of the relationship between supplementary disclosures and changes in value. The third section details the results of statistical testing of the relationship between supplementary disclosures and changes in analysts' valuation models used. Results from statistical testing for differences in proportions for financial ratios used are presented. Analysts' perceived usefulness of each of the five supplementary disclosure schedules are also presented. Some typical comments about the supplementary disclosures by respondents are cited. Finally the chapter is summarized briefly.

Collection of Data

As discussed in Chapter IV, financial analysts in the Dallas/Fort Worth, Houston and Oklahoma regions were randomly chosen to participate in this study. Data were collected using personal interviews and printed questionnaires. Fourteen analysts from each of the three regions
(or a total of 42) completed valuation for Case I and for Case II separately. All of these responses were usable. These interviews were performed in February, March and April of 1983.

Specific limitations of this study arose from the data collection process. One limitation is in the area of user group and another is in the geographical area studied. A sample of members of the Financial Analysts Federation is not necessarily representative of analysts who are not members of this group, nor is it representative of member analysts not currently engaged in security analysis. A sample drawn from members in the Dallas/Fort Worth, Houston and Oklahoma regions is not necessarily representative of members in other geographical areas of the Federation, and thus these results may not be generalized to members of other areas or to other user groups. The use of supplementary disclosures which might not be thoroughly familiar to analysts imposed a further limitation of results that generalizations derived from this study are applicable only to the time period when the study was conducted.

Results of Research Procedure I

This section presents a discussion of the results of testing the four null hypotheses presented in Chapter IV regarding the issue of change in value. Any statistical difference between valuations for Case I and valuations for
Case II was attributed to the use of the supplemental disclosure information presented in Case II. No evidence to support an expectation of significantly higher values for Case II than for Case I exists. Thus a one-tailed test of significance was rejected in favor of a two-tailed test to determine difference in distributions. The test of significant difference between two distributions used here employed the Mann-Whitney U statistic for sample distribution of less than twenty observations, and employed the Z statistic for sample distribution of twenty or more observations.

Preliminary analysis of the data indicated the need for nonparametric testing. Appendix E presents various statistical measures for each of the four null hypotheses regarding changes in value. In seven of eight cases the samples did not appear to have come from normally distributed populations. Five distributions were skewed left and two distributions were skewed right. One distribution indicated normality but it had only two observations which was too small to ignore individual differences. Referring to the skewness coefficient, two of the left-skewed distributions appeared heavily skewed to the left while three of them appeared moderately skewed to the left. Both right-skewed distributions appeared heavily skewed to the right. Referring to the kurtosis coefficient, one distribution
appeared flatter than a normal curve (platykurtic), six
distributions appeared more peaked than a normal curve
(leptokurtic), and one distribution appeared indeterminable
because of the very small number of observations in this
particular sample. Thus, the sample data was not normally
distributed. Furthermore, the differences in standard
deviation, which were spread over a wide range, suggested
the assumption of homoscedasticity was not valid. Thus the
assumptions of normally distributed sample population and
homoscedasticity, which are necessary for the proper
application of a parametric testing, were not present in the
sample distributions of this study. This is consistent
with the expectations presented in Chapter IV. The non-
parametric Mann-Whitney rank test is valid for all distri-
butions whether continuous or discrete, and doesn't require
normality of distribution nor homogeneity of variance. It
requires data on at least an ordinal scale. The data of
this study meets this criteria and the Mann-Whitney U Test
is used to determine significant changes in value estimates.
Frequency distributions of estimated stock values are pre-
sented in Appendix F.

The null hypothesis for the total sample using all
methods of valuation stated that there is no difference in
financial analysts' valuation of an oil and gas producing
company using only basic financial statements and valuation
using basic financial statements plus supplementary disclosures. Table I shows the test results for this hypothesis. This sample contained more than twenty observations, so the Z statistic was used along with the two-tailed probability of its occurrence. The null hypothesis is rejected for a two-tailed test at a significance level of .05 when the calculated Z is equal to or greater than 1.96. Table I shows a calculated Z of -2.2687 which is greater in absolute value than 1.96. The probability of occurrence of a Z value \( Z \leq -2.2687 \) for this null hypothesis is 0.0233. Thus, consistent with our expectations, the null hypothesis was rejected, indicating that there is a significant difference between financial analysts' valuation of an oil and gas producing company.

### Table I

<table>
<thead>
<tr>
<th></th>
<th>Case I</th>
<th>Case II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Rank</td>
<td>36.34</td>
<td>47.52</td>
</tr>
<tr>
<td>Corrected for Ties</td>
<td>( U = 629.0 )</td>
<td>( Z = -2.2687 )</td>
</tr>
<tr>
<td></td>
<td>Two-Tailed P = 0.0233</td>
<td></td>
</tr>
</tbody>
</table>
using only basic financial statements and valuations using basic financial statements plus supplementary disclosures. The test results indicated that the supplementary disclosures influenced the valuations of Case II when all observations for all methods of valuation are grouped.

Changes in valuation were also tested by grouping responses by valuation method. The null hypothesis for the constant period net present value method stated that there is no statistically significant difference between stock valuation of Case I and stock valuation of Case II using the constant period net present value method. Table II presents the test results for this hypothesis. This sample contained fewer than twenty cases and the U statistic with a two-tailed probability of occurrence was used. The null

**TABLE II**

**TEST RESULTS FOR CHANGES IN VALUATION FOR THE NET PRESENT VALUE METHOD**

<table>
<thead>
<tr>
<th>Case I</th>
<th>Case II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Rank = 5.78</td>
<td>Mean Rank = 7.00</td>
</tr>
<tr>
<td>N = 9</td>
<td>N = 2</td>
</tr>
<tr>
<td>Corrected for Ties</td>
<td></td>
</tr>
<tr>
<td>U = 7.0</td>
<td>Z = -0.4769</td>
</tr>
<tr>
<td></td>
<td>Two-Tailed P = 0.6335</td>
</tr>
</tbody>
</table>
The null hypothesis for the relative value method states that there is no statistically significant difference between stock valuations of Case I and stock valuations of Case II using the relative value method. Table III shows the test results for this hypothesis. This sample contained fewer than twenty observations and the U statistic with a two-tailed probability of its occurrence was used. The significance level was computed using the

algorithm of Dineen and Blakesley\textsuperscript{2} as applied for observations of less than thirty in number. Table III shows a calculated $U$ of 92.0 which is greater than the quantile table value of 55 for the .05 significance level for a two-tailed test. Thus, contrary to our expectations, the null hypothesis was not rejected. There is no statistically significant difference between stock valuations of Case I and stock valuations of Case II using the relative value method. The test results for valuations by analysts using the relative value method indicated that the supplementary disclosures did not lead to a Case II valuation significantly different from Case I. Several possibilities exist

\begin{table}[h]
\centering
\begin{tabular}{|c|c|}
\hline
\textbf{Case I} & \textbf{Case II} \\
\hline
Mean Rank = 14.61 & Mean Rank = 15.64 \\
$N = 18$ & $N = 11$ \\
\hline
Corrected for Ties & \\
$U = 92.0$ & $Z = -0.3152$ Two-tailed $P = 0.7526$ \\
\hline
\end{tabular}
\caption{TEST RESULTS FOR CHANGES IN VALUATION FOR THE RELATIVE VALUE METHOD}
\end{table}

which might explain why no difference was found. Analysts may have been insufficiently familiar with the supplementary disclosures to use the information in their valuation procedures. The disclosures may have indicated values so far into the future that they did not impact values today, as represented by estimates of future cash flows and by the multiples they used. The supplementary disclosures may have indicated excessively high future recovery costs which nullified the values of reserves in the ground. The large number of analysts shifting to asset valuation for valuing Case II may have affected these results. Selected examples of valuations using the relative value methods are presented in Exhibit II in Appendix G.

The null hypothesis for the asset valuation method states that there is no statistically significant difference between stock valuation of Case I and stock valuations of Case II using the asset valuation method. Table IV presents the test results for this hypothesis. This sample for Case I contained fewer than twenty observations (15) and for Case II contained more than twenty observations (29). Both the U and Z statistics were used to determine the existence of a statistically significant difference because of the problem created by different cell sizes. If both U and Z statistics indicated significant difference in
valuations, one can be relatively assured the significant difference is valid. Table IV shows a $Z$ of $-4.0316$ with a two-tailed probability of 0.0001. A calculated $Z$ of $-4.0316$ is greater in absolute value than 1.96, which provided

TABLE IV
TEST RESULTS FOR CHANGES IN VALUATION FOR THE ASSET VALUE METHOD

<table>
<thead>
<tr>
<th></th>
<th>Case I</th>
<th></th>
<th>Case II</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Rank</td>
<td>11.73</td>
<td>Mean Rank</td>
<td>28.07</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>15</td>
<td>N</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Corrected for Ties</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$U$</td>
<td>56.0</td>
<td>$Z$</td>
<td>-4.0316</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Two-Tailed $P$</td>
<td>0.0001</td>
<td></td>
</tr>
</tbody>
</table>

evidence for rejection of the null hypothesis. The calculated $U$ of 56.0 is less than the quantile table value of 138 for the .05 significance level, which also provided support for rejecting the null hypothesis. Thus, as expected, there was a statistically significant difference between stock valuations of Case I and Stock valuations of Case II using the asset valuation method. The test results indicate the supplementary disclosures influenced the valuation of Case II for analysts using the asset valuation method. Selected examples of the asset valuation methods
used are presented in Exhibit III in Appendix G.

It was concluded from the test results that stock valuations of members of the Financial Analysts Federation in Dallas/Fort Worth, Houston and Oklahoma regions during February, March and April of 1983 were influenced by supplementary disclosures in the following ways. Supplementary disclosures influenced stock valuations significantly for the total sample of all methods and for the asset valuation methods. The influence for the constant period net present value method was indeterminable because of only two observations using this method for Case II valuations. Supplementary disclosures appeared not to have influenced stock valuation for those analysts using the relative value method.

Research Procedure II

The chi-square test of independence for two sample distributions was applied to test the null hypothesis that supplementary disclosures would not cause analysts using one method of valuation for Case I to switch to using a different method of valuation for Case II. Seven analysts who used the constant period net present value methods of valuation for Case I switched to the asset valuation methods for Case II. Seven analysts who used the relative valuation methods for Case I switched to asset valuation methods for Case II.
The results of the chi-square test which are presented in Table V show the probability of obtaining a chi-square of 10.599 or larger is less than 0.005, which suggested that the results are statistically significant. The critical chi-square value for two degrees of freedom at a significant level of .05 is 5.991. The calculated value of 10.599 is greater than the critical value of 5.991 and the null hypothesis was rejected. Since the cell frequencies deviate so greatly from what would be expected under statistical independence, one could conclude that a systematic relationship does exist. The Cramer's V of 0.355 (which ranges from 0 to +1) indicated a moderate degree of association existed, but didn't reveal the manner of the association. It can now be concluded from this evidence that the supplementary disclosures provided in Case II caused the analysts to switch valuation methods between Case I and Case II.

However we could not determine the manner in which switches occurred from the chi-square or the Cramer's V tests. A review of the individual cell frequencies suggested the following. The proportion of analysts using constant period net present value methods for Case I was greater than the proportion of analysts using constant period net present value methods for Case II. The

\[3\text{Emory, p. 459.}\]
**TABLE V**

TEST RESULTS FOR CHANGES IN VALUATION METHOD

<table>
<thead>
<tr>
<th>Method</th>
<th>Case I</th>
<th>Case II</th>
<th>Row Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant Period</td>
<td>N</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Net Present Value</td>
<td>%</td>
<td>21.4</td>
<td>4.8</td>
</tr>
<tr>
<td>Relative Value</td>
<td>N</td>
<td>18</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>42.9</td>
<td>26.2</td>
</tr>
<tr>
<td>Asset Value</td>
<td>N</td>
<td>15</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>35.7</td>
<td>69.0</td>
</tr>
<tr>
<td>Column Total</td>
<td>N</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>50.0</td>
<td>50.0</td>
</tr>
</tbody>
</table>

Computed chi-square = 10.599**
Cramer's V = 0.355

*Column percent
**Significant at the 0.005 level
proportion of analysts using relative value methods for Case I was greater than the proportion of analysts using relative value methods for Case II. The proportion of analysts using asset valuation methods for Case I was less than the proportion of analysts using asset valuation methods for Case II. This was consistent with the facts that seven analysts using constant period net present value methods for Case I and seven analysts using relative value methods for Case I all switched to using asset valuation methods for Case II. All fifteen analysts using asset valuation methods for Case I also used asset valuation methods for Case II. It appeared that the supplementary disclosures provided only in Case II caused switches in method of valuation for Case II for some of the analysts using either constant period net present value or relative value methods for Case I. Thus, from the chi-square and Cramer's V test results, and from the analysis of individual cell proportions it appeared that the supplementary disclosures caused some switching of valuation method, and that the switching occurred from the constant period net present value methods and the relative value methods for valuing Case I to the asset valuation methods for valuing Case II.

Appendix G presents some representative valuation methods for each of the valuation methods discussed. Two
analysts stated they would have used the multi-period net present value method if they had more time and computer availability.

Research Procedure III

The test of differences between two proportions was used to test for any significant differences between financial ratios preferred for Case I and financial ratios preferred for Case II. Frequency distributions are presented in Appendix H for each of the ratios and items of information provided for both Case I and Case II. Five ratios and year-end stock price were chosen for testing on the basis of the greater number of responses. If no differences were found for these six items, it would be assumed that no differences would be found for the others. The six items chosen for testing were earnings per share, price-earnings ratio, interest coverage, return on assets, year-end stock price and total assets to total liabilities. Results of this testing were reported by the probability that the existing spread for analysts' preference for the same ratio in Case II could occur by chance alone, assuming the null hypothesis were true. Table VI summarizes the results of the six tests of differences between the two proportions for each ratio tested. The table clearly demonstrates high P values for the six ratios tested, which indicates the
spreads have high percentages of occurring by chance alone. Apparently the supplemental disclosures did not effect analysts' preference for ratios between the two cases. The

TABLE VI

TESTING RESULTS FOR ANALYSTS' PREFERENCE FOR SELECTED RATIOS AND STOCK PRICE

<table>
<thead>
<tr>
<th></th>
<th>Z</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earnings per share</td>
<td>0.278</td>
<td>78%</td>
</tr>
<tr>
<td>Price to earnings</td>
<td>0.330</td>
<td>74%</td>
</tr>
<tr>
<td>Interest coverage</td>
<td>0.000</td>
<td>100%</td>
</tr>
<tr>
<td>Return on assets</td>
<td>0.658</td>
<td>58%</td>
</tr>
<tr>
<td>Year end stock price</td>
<td>0.385</td>
<td>70%</td>
</tr>
<tr>
<td>Total assets to total liabilities</td>
<td>-0.385</td>
<td>70%</td>
</tr>
</tbody>
</table>

null hypotheses for all six tests could not be rejected. The probabilities for each test suggested that the spreads between analysts' preferences for the ratio in Case I and analysts' preferences for the same ratio in Case II could have occurred by chance alone.

Additional Evaluation

Additional evaluation was attempted to determine analysts' perceived usefulness of each of the five schedules of the supplementary disclosure requirements.
Results were reported by the number of analysts finding the schedule useful as a percent of the total 42 analysts responding. Further evaluation detailed analysts' preferences for each disclosure schedule by valuation methods analysts used by preferences as a percent of total responses.

The schedule of capitalized costs relating to oil and gas producing activities was preferred by 33% of responding analysts. The schedule of costs incurred in oil and gas producing activities was preferred by 26%. The schedule of results of operations for producing activities was preferred by 35%. The schedule of reserve quantity information was preferred by 76%. The schedule of standardized measure of discounted future net cash flows and changes therein relating to proved oil and gas reserves was preferred by 72%. On a simple majority basis, evaluation indicated that only the quantity disclosure and the standardized measure disclosure appeared useful to analysts in valuing an oil and gas producing company.

Table VII presents the percentage of analysts preferring the various disclosure schedules by methods of valuation they used. Percentages of numbers of analysts responding to a total of 42 responses are presented in the table. It can readily be seen that those analysts using asset valuation methods considered the disclosure schedules


<table>
<thead>
<tr>
<th>Supplementary Disclosure Schedule</th>
<th>Constant Period Net Present Value</th>
<th>Relative Value</th>
<th>Asset Value</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capitalized Costs Relating to Oil and Gas Producing Activities</td>
<td>2%</td>
<td>9%</td>
<td>21%</td>
<td>33%</td>
</tr>
<tr>
<td>Costs Incurred in Oil and Gas Producing Activities</td>
<td>2%</td>
<td>7%</td>
<td>17%</td>
<td>26%</td>
</tr>
<tr>
<td>Results of Operation for Producing Activities for the Years Ended</td>
<td>2%</td>
<td>12%</td>
<td>21%</td>
<td>35%</td>
</tr>
<tr>
<td>Reserve Quantity Information</td>
<td>2%</td>
<td>19%</td>
<td>55%</td>
<td>76%</td>
</tr>
<tr>
<td>Standardized Measure of Discounted Future Net Cash Flows and Changes Therein to Proved Oil and Gas Reserves</td>
<td>2%</td>
<td>17%</td>
<td>53%</td>
<td>72%</td>
</tr>
</tbody>
</table>
more useful than those using the other two methods of valuation. Further, those analysts using asset valuation methods seemed to consider the reserve quantity disclosure and the standardized measure disclosure more useful than the other three disclosures. This preference was less clear for those analysts using constant period net present value methods and relative value methods.

It appeared from evaluating analysts' perceived usefulness of the five disclosure schedules that the disclosures required by the proposed FAS No. 69 were not universally considered useful by analysts surveyed in this study. It also appeared that only the reserve quantity and standardized measure disclosure schedules received support of preference from a majority of the analysts surveyed. However further empirical study is needed to determine the reason why considerable number of analysts considered these schedules of little value.

During the development of this study the Proposed Statement of Financial Accounting Standards entitled "Disclosures about Oil and Gas Producing Activities" was formally adopted as FAS No. 69 with few changes. The footnote citation for this standard is as follows: Financial Accounting Standards Board, "Disclosures about Oil and Gas Producing Activities," Statement of Financial Accounting Standards No. 69 (Stamford, Connecticut, November 1982). There were only very minor changes made in the final draft of FAS No. 69 from the proposed exposure draft on which this research was based. These changes are explained in Chapter II. Thus, the proposed disclosure schedules are here referred to as the proposed FAS No. 69.
A Few Typical Comments by Respondents

Respondents expressed a variety of reactions to the required disclosures of the proposed FAS No. 69. A sampling of these comments is presented in paraphrased form in order to report the range of reactions in greater detail. The following comments on the supplementary disclosures were typical of those made by respondents to Case II:

Capitalized Costs Relating to Oil and Gas Producing Activities:

1. My estimate of value is not changed by the disclosure, even though capitalized costs are a boost to EPS.

Results of Operation for Producing Activities:

1. The exclusion of overhead and financing costs, and the inclusion of income tax expense, which is of little value, makes this schedule not of much value.

2. This schedule provides no information on the leases expiring during the year.

Reserve Quantity Information:

1. Disclosures should provide average price received for production of oil and condensate, gas liquids, and natural gas. Quantities of gas liquids should be shown separately.

2. Reserve decline curves should be disclosed.
Standardized Measure of Discounted Future Net Cash Flows and Changes Therein to Proved Oil and Gas Reserves:

1. This schedule doesn't indicate the life of future cash streams, but it could be used as a primary scanning tool.

2. The standardized measure doesn't provide a separate breakdown for oil and gas for future development costs, and doesn't provide information for reporting by geographic areas in the United States.

3. The use of a 10% discount of future net cash flows is inappropriate because a 15% to 20% discount provides for an element of conservatism in estimating value.

4. The 10% discount is not realistic.

5. The reconciliation of the standardized measure is difficult to understand.

6. The standardized measure doesn't give reliable figures which means comparability is not enhanced by this disclosure.

General Comments on Disclosures:

1. I prefer as much disclosure as possible.

2. Historical cost information for an oil and gas company is usually not representative of current asset values.
3. The supplementary disclosures don't effect valuation because the same assumptions and problems revealed from analyzing Case I are still present in Case II.

4. The disclosures are useless because the efficient market has already discounted this information in the current market price of the stock.

5. These disclosures are just muddying the waters again.

6. Without reserve information and/or future net revenue estimates, it is extremely difficult to value Case I.

7. The main problem is that reserve quantities and the standardized measure are based on engineering estimates of reserves, which have a very poor track record.

8. I would rather have gasoline a few cents cheaper at the pump than have these disclosures.

These comments ranged from favorable to unfavorable and suggested the issue of proper disclosures for an oil and gas producing company is far from being resolved in the minds of the analysts surveyed.

Summary

In this chapter the responses of analysts were presented and analyzed. Each stated hypothesis concerning the
effects of the proposed FAS No. 69 supplementary disclosures on changes in value was presented along with the results of statistically testing responses with the Mann-Whitney U Test. The hypothesis concerning the effects of these disclosures on changes in valuation methods from analyzing Case I to analyzing Case II was stated along with the results of statistically testing responses with the chi-square and Cramer's V tests. The differences between financial ratios preferred for Case I and those preferred for Case II were stated as the result of statistically testing for differences with the test of difference between two proportions. Analysts' perceived usefulness of the five schedules of the supplementary disclosures were reviewed in terms of the percent preferring the schedule to the total responses. Some typical comments of analysts about the disclosures were listed.

In the next chapter this study is summarized, conclusions are reported and fields for further research are suggested.
CHAPTER VI

SUMMARY AND CONCLUSIONS

This chapter presents a summary of this research which includes a statement of the problem, the objective of the study, and the research methodology utilized. Results and conclusions are followed by a brief comparison of the Exposure Draft and the FAS No. 69. Recommendations for future research are stated followed by a recommendation.

Statement of the Problem

The purpose of this research was to determine if there was a difference in analysts' estimates of value of oil and gas producing enterprises between valuation based only on basic financial statements and valuation based on financial statements plus supplemental disclosures.

Oil and gas financial accounting has long been controversial because of the deficiencies of historical cost-based financial statements in allowing analysts to assess timing, amounts and uncertainties of expected net cash flows; because no uniform method of accounting for oil and gas producing activities has been required; and because the cost of existing reserves is not a relevant indicator of either cash inflows from sales or cash outflows to replace
these reserves. In addition, unique industry characteristics such as dry well risk and prolonged lag time between discovery and sale render historical cost-based financial statements of oil and gas producers even less relevant than accounting data for other industries. The FASB and the SEC have made several attempts to develop supplementary disclosure data to assist users in assessing future net cash flows, estimating values of mineral reserves, and comparing operating results of companies in the oil and gas industry. These were reviewed in detail in Chapter II. The most recent attempt is the development of "Disclosures about Oil and Gas Producing Activities" by the FASB.¹ The process of developing a FASB standard involves developing and circulating an Exposure Draft on the subject prior to accepting and issuing the standard. The Exposure Draft² detailed proposed required disclosures for oil and gas producing activities and were used in the case studies of this dissertation. Oil and gas companies, the accounting profession and some financial analysts have been skeptical of the usefulness of disclosing reserve


quantities and reserve values. Wright suggested this skepticism was probably due to the difficulty in estimating reserve quantities and to the lack of empirical evidence concerning the usefulness of the disclosures to investors. This study addressed the issue of empirical evidence concerning the usefulness of oil and gas disclosures.

Financial analysts may use any number of methods to derive expected stock value. These models were classified into three categories: net present value models for either constant or multi-periods; relative value models using either fundamental or technical analysis; or asset valuation models using book value, liquidation value, merger or acquisition value, or some "intrinsic" value. The theoretical underpinnings and practical applications of these models were explained in detail in Appendix A. The effect of the supplementary disclosures on the application of these valuation models was also studied.

Objective of the Study

The objective of this dissertation was to obtain empirical evidence regarding the usefulness of supplementary disclosure requirements to Dallas/Fort Worth, Houston and

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Oklahoma financial analysts in assessing the expected stock price of an oil and gas producing company. This analysis hinged on determining what supplementary disclosure information would be used, to what extent it would be used, and which type of information would be used the most. Secondary issues in this research were to determine if supplemental disclosures effected analysts' usage of ratios and item information, and whether supplementary information is used to a greater extent in any one of the valuation models.

Research Methodology

Two main research hypotheses were developed to evaluate the usefulness of the proposed oil and gas disclosures for oil producing companies:

I. There is no difference in financial analysts' valuation of an oil and gas producing company using only basic financial statements and valuation using basic financial statements plus supplementary disclosures.

II. Supplemental disclosure information, which was presented only in Case II, does not cause analysts using one method of valuation for Case I to switch to a different method of valuation for Case II.

Determinations were made on the usefulness of ratio and price information, the preference for each of the five
supplemental disclosure schedules, and the frequency of the use of supplemental disclosures reported by valuation method.

Forty-two randomly selected analysts in the Dallas/Fort Worth, Houston and Oklahoma regions of the Financial Analysts Federation were personally interviewed by using a pre-tested printed questionnaire. Each respondent was first given Case I for valuation, where Case I included only basic financial statements with ratio information. After valuation of Case I was completed and returned to the interviewer, the respondent was handed Case II for valuation. Case II included the same information of Case I plus the proposed required oil and gas producer supplementary disclosures.

Hypothesis number I was tested by using the Mann-Whitney U Test for responses in the aggregate and also for responses categorized by method of valuation used. Analysis demonstrated that normally-distributed populations were not present, and differences in variance indicated the assumption of homoscedasticity was not present. The data of this sample met the requirements of the Mann-Whitney U Test. Responses were evaluated by using either the Z or U statistic and the two-tailed probability level corrected for ties. The SPSS was used to test each null hypothesis at the .05 level of rejection.
Hypothesis number II was tested by using the chi-square test of independence for two sample distributions, and by using the Cramer's V to test for strength of relationship. The calculated chi-square value was compared with the critical value with the same degrees of freedom and at the .05 level of significance. The Cramer's V ranges from 0 to +1 with the higher value signifying a high degree of association, but not the manner of the association. An analysis of the proportion of analysts using a valuation method for Case I, to the proportion of analysts using that same method for Case II helped determine the manner of the association.

Six of the eighteen items of information provided for both Cases were tested for differences between the stated preference of the ratios for analyzing Case I and the stated preference for using the same ratio for Case II. The test of differences between two proportions was applied to each of the six most frequently used items to determine if the differences occurred by chance alone.

Additional evaluation involved applying percentage responses to total responses for each of the five schedules of the proposed supplementary disclosures. Each schedule was evaluated by the percent of analysts finding the schedule useful to total responses to Case II. This indicated which schedule was considered more useful than
others in making valuations. A determination was then made concerning whether the analysts using any one method preferred the supplemental disclosure more than those using other methods. The results of this study are not necessarily representative of members of the Financial Analysts Federation in other geographic areas, and are applicable only to the time period when they were collected.

Results and Conclusions

Statistical testing for changes in value revealed that normal distributions were not present and that the assumption of homoscedasticity was not valid. Testing for changes in value were then analyzed using the Mann-Whitney U Test. Results indicated there was a significant difference in analysts' valuation of an oil and gas producing company using only basic financial statements and valuation using basic financial statements plus supplementary disclosures when all observations for all methods of valuation were grouped, and for the asset valuation method. The null hypothesis for the relative value method was not rejected, and that for the constant period net present value method could not be evaluated due to small sample size. For all methods grouped and for the asset valuation method, supplementary disclosures on oil and gas producing activities did affect a significant difference in change of estimated value. Several possibilities existed which could have
explained the lack of effect observed in the relative value method. Analysts' lack of familiarity with the disclosures, perception of value too far in the future to impact current values, half of the analysts switching to the net valuation method for Case II, or high future development costs nullifying reserve values could have explained the lack of observed effect for the relative value method. Overall the results supported the conclusion that supplementary disclosures did cause a change in estimated value and thus were considered useful by analysts.

The chi-square and Cramer's V tests were applied to determine whether supplementary disclosures caused a change in method of valuation. Results indicated the null hypothesis was rejected, but only a moderate degree of association existed. A review of the individual cell frequencies with the chi-square and Cramer's V test results suggested supplementary disclosures did cause analysts to change valuation methods from Case I to Case II. Also the changes occurred for some of the analysts, using either constant period net present value or relative value methods, to switch to the asset valuation method for valuing Case II. No analysts using the asset valuation method for Case I switched to a different method for valuing Case II.

It was concluded that supplementary disclosures caused both changes in estimated value and changes in the method
of valuation. Thus the supplementary disclosures were considered useful by analysts.

The test of differences between two proportions was used to determine any significant difference between financial ratios and information preferred for Case I and those preferred for Case II. Six of the eighteen ratios and items of information were tested. The ratios and information tested were earnings per share, price-earnings ratio, interest coverage, return on assets, year-end stock price, and total assets to total liabilities. Probabilities for each test indicated the spreads between analysts’ preferences for the information in Case I and analysts’ preferences for the same information in Case II generally occurred by chance alone. Thus the supplementary disclosures appeared to have no effect on analysts’ preference for ratios between the two cases.

Additional evaluation was applied to determine analysts’ perceived usefulness of each of the five schedules of the supplementary disclosure requirements, by percentage of analysts finding the schedule useful as a percent of the total 42 analysts responding. The reserve quantity and standardized measure schedules each were preferred by more than 70% of the respondents. But each of the other three schedules were preferred by 40% or less of the respondents. A similar evaluation was attempted to
determine whether analysts using one method considered each of the disclosure schedules more useful than those using the other two methods of valuation. Results indicated analysts using the asset valuation method considered the disclosure schedules more useful than those using the other two methods. Also, those analysts using the asset valuation method seemed to consider the reserve quantity and standardized measure schedules more useful than the other three schedules. This preference was less clear for those analysts using the other two methods of valuation. Comments made by analysts about the disclosures ranged from favorable to unfavorable, which suggested the issue of proper disclosures for an oil and gas producing company was far from being resolved.

Exposure Draft Compared

The schedules of required disclosures of the Exposure Draft, which were used in this study, received only minor changes in the final requirements of FAS No. 69. Only part of the standardized measure schedule was changed from being one of reconciliation in total and by geographic area to one of a statement of principal sources of change in total, not by geographic area. It was expected that these changes were so minor that the results of this survey would not be affected by them. Thus it was reasonable to expect that
the results of this study could have been applied to the final disclosures as required by FAS No. 69.

Minor changes were made in the disclosures required for oil and gas producing companies as stated in the Exposure Draft. The FAS No. 69 made no change in the capitalized costs schedule. It deleted the line item of production costs from the costs incurred schedule. It required detailing revenues by line items for sales, transfers and total revenues. No change was made for the schedule of reserve quantity information. No change was made for the first part of the schedule for standardized measure of discounted future net cash flows. But it did change the second part of this schedule from being a statement of reconciliation by geographic area of beginning and year-end discounted future net cash flows, to one stating the principal sources of change in total in this standardized measure schedule. This change involved deleting the line items of beginning of year, net changes in purchases and sales of minerals in place, and end of year. It also deleted "development costs" from the line item for net changes in prices.

Recommendations for Future Study

The conclusions derived from this study were qualified by the limitations and assumptions described in Chapter I. The small sample size of Case II valuations using the
constant period net present value method suggested the need to survey a larger number of respondents for a larger geographic area. A larger sample might also result in the occurrence of observations using the multi-period net present value method, none of which were observed in this study. The sample size and geographic area of this research was limited by the high cost of gathering the data.

Future research would be useful on trying to determine the reasons the supplementary disclosures had no effect on the valuations made using the relative value method. It could be that analysts seek and respond to other financial information such as quarterly financial reports or industry news letters, and the absence of such information in the cases presented in this study did not provide the facts on which to adjust their valuations of Case I. Other possible reasons could have been analysts' lack of familiarity with the disclosures, their perception that benefits would occur too far in the future to affect current value, or something in the disclosures nullified the expected future benefits. Further study would help clarify this issue.

Further study would be in order to determine the reasons why a considerable number of analysts considered some of the supplementary disclosures of little value. This study indicated the supplementary disclosures did cause changes in value and changes in valuation method used,
but when analysts were asked to respond concerning the usefulness of each disclosure schedule, only two of the schedules received a majority of analysts preferring them. It would be helpful to determine why the other schedules were not preferred.

Replication of the methodology applied in this research in different parts of the country and/or applying it to a broader population of users of financial information would be useful to determine if the results obtained in this study would be supported. Financial analysts represent just one group of users of the many groups using financial information.

Recommendation

The results obtained in this research indicated supplementary information on oil and gas producing activities was needed and was used by financial analysts in valuing an oil and gas producing company. It appears appropriate for the FASB and the SEC to require disclosures about oil and gas producing activities, but modification and improvement of the disclosure requirements should be based upon the results of empirical investigation.
Stockholder wealth is maximized when expected returns from current and future investment, as reflected in share price, are maximized. Share price is readily available, reflects both timing and risk of expected future cash flows and is determined by capital markets. The process of price determination reflects the planning, implementation and control of investment, financing and dividend decisions which determines the risk-return characteristics, which are then valued in the market place. Feedback in the form of a price reflecting these risk-return characteristics is considered in the planning phase which takes into account environmental constraints as well.

Within the constraints of the current business cycle and in industry's performance in it, stock price is estimated by determining the present value of expected future cash flows and the risks of not attaining them; or by evaluating historical price performance through fundamental or technical analysis and projecting future performance discounted for risk; or by establishing liquidation values discounted for uncertainty. The primary variable in
all present value methods and in some relative price-earnings models is the projected growth rate of earnings. The next determination is the ability of the company to finance this growth.

**Development of financial theory.** A useful way to present the development of financial theory is to discuss the evolutionary development of the capital asset pricing model (CAPM). The evolutionary development of the CAPM, from which the security market line is derived, begins in utility theory of investor choice. The theory of investor choice provided the basis for development of the state-preference theory and for the development of the mean-variance theory. Copeland and Weston\(^1\) present two routes toward consistent valuation of individual securities, one being the option pricing model and the other being the CAPM.

The economic theory of investor choice begins with the assumption of preferring more wealth to less, plus the axioms of cardinal utility which are comparability, consistency, strong independence, measurability and ranking. These led to utility functions to maximize investor expected utility of wealth assuming positive marginal utility. Utility is a function of expected return and

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standard deviation. Investors may be risk averse, risk neutral or risk seeking. A risk averse investor who perceives the utility of a potential gain to be less than the utility of a potential loss would want odds in his favor. Utility can be plotted on an indifference map which shows the indifference curve of a risk averter as the function of the mean and standard deviation of a distribution of returns. The shortcoming of the theory of choice is the assumption that all returns are normally distributed.\(^2\)

State preference theory views the objects of investor choice as prices and payoffs in different states of nature. An underlying pure security price is then determined from the payoff data and the prices of securities. The state preference theory provides a method which allows for the individual's choice decision as well as achieving equilibrium conditions for the economy. This results in a set of valuation relationships. Portfolio separation must prevail to make value relationships independent of individual utility preferences. Fisher's separation theorem says that given perfect capital markets, the investment decision is governed solely by market criteria without regard to individual preferences.\(^3\) Arranging the outcomes of

\(^2\)Ibid., p. 88.

different states of nature allows specification of a security as risk-free or risky. Portfolio selection involves selecting risky asset portfolios and selecting combinations of risky and risk-free assets. Portfolios of different expected outcomes then can be created.

Mean-variance portfolio theory allows for the quantification of risk. Measures of location and dispersion are used to measure return and risk for both single assets and portfolios. Expected utility is maximized where one's indifference curve is tangent to his opportunity set, at which point the marginal rate of substitution between his preferences for risk and return must equal the marginal rate of substitution of the opportunity set. This implies a linear trade-off between return and risk. Assuming perfect markets including borrowing and lending at the risk-free rate, homogeneity of investor's beliefs, and a mean-variance utility function, all will have the same linear efficient set called the capital market line. The equation for the capital market line is:

\[ K_p = R_f + \left( \frac{K_m - R_f}{\sigma_m} \right) \sigma_p \]

The return of the portfolio is equal to the risk-free rate of return plus the market price of risk times the quantity

\(^4\)Copeland and Weston, pp. 119-159.
of risk. The two fund separation principle states that each investor has a utility maximizing portfolio which includes both risk-free and risky assets.

Risk can be defined as risk in isolation and risk in portfolio. Risk in isolation is the probability of getting a return different from what was expected. The risk-free rate of return yields the expected return. Risk in a portfolio context recognizes that the inclusion of assets not perfectly correlated with the remainder of the portfolio reduces the portfolio's standard deviation. The appropriate measure of the contribution of an individual asset to portfolio risk is the covariance of its return with the return of the remainder of the portfolio. Diversification can reduce dispersion to a minimum effectively eliminating unsystematic risk, but systematic risk is still present. The portfolio decision problem is to invest a percentage of the portfolio in an asset which minimizes variance subject to the expected return constraint.6

The capital asset pricing model (CAPM) values risky assets in equilibrium and establishes the appropriate measure of risk as the covariance of returns between the risky asset and the market. The CAPM behaves as though the


6Copeland and Weston, p. 143.
following assumptions are true: investors are risk-
averse individuals maximizing the expected utility of their
end-of-period wealth; they are price takers having homo-
geneous expectations; they can borrow or lend an unlimited
amount at a risk-free rate of return; quantities of assets
are fixed; assets are perfectly divisible and liquid; asset
markets are frictionless; and there are no market restric-
tions such as taxes or short selling limits.\(^7\) Although the
model is not perfectly validated by empirical testing, the
main implications of it regarding investor behavior are
upheld. Systematic risk is the only valid measure of risk,
the model is linear and trade-offs between return and risk
are positive.\(^8\)

The security market line is defined as the risk-free
rate of return plus the risk premium, which is the price
or risk multiplied by the quantity of risk. The price of
risk is the difference between the expected rate of return
and the risk-free rate of return. The quantity of risk is
beta which is the covariance between expected returns on
the risky asset and the market portfolio divided by the
variance of the portfolio. Covariance risk measures the
change in portfolio risk as the weights of an individual

\(^7\)Ibid., pp. 160-161.

\(^8\)Ibid., p. 186.
asset in the portfolio are changed. The security market line equation is:

\[
\bar{K}_j = R_F + \beta_j (\bar{K}_m - R_F) \quad \text{where} \quad \beta = \frac{\text{Cov} R_j R_m}{\sigma_m^2}.
\]

In equilibrium every asset must be priced so that its risk-adjusted required rate of return falls on the security market line. Increasing inflation shifts the security market line upward, and alterations in risk aversion changes its slope. If a security has returns below the security market line it is considered to be yielding an inadequate return. Stock prices can change for four reasons exemplified by the following equation:

\[
k_j = RR_F + IP + \beta [k_m - (RR_F + IP)].
\]

Stock prices change because of a change in the real risk-free rate of return (\(RR_F\)), changes in the rate of inflation (\(IP\)), changes in beta and changes in the degree of risk aversion.

Valuation theory. Lorie and Brealey suggest there is widespread agreement about what determines security value.

and what must be estimated to choose profitability among them, but neither theory nor sages have been able to make these estimates with superior skill.\textsuperscript{10} The theory of valuation is stimulating, such as Durand's discussion of the Petersburg paradox and security prices.\textsuperscript{11} The paradox arises because theoretically a security should have infinite value if the expected rate of growth in benefits is greater than the rate at which these benefits are discounted. But no infinite value security has been identified. He offers four possible solutions to this paradox which focuses on some important factors in valuation. Perpetually high rates of growth are impossible; more distant benefits need to be discounted at a higher rate; the utility of a growing dividend stream is less than the discounted monetary value; and the required rate of return on securities must rise until their present value matches investor's resources.

Stock valuation models depend on the proper definition of cash flows, which is after tax operating cash flows, Modigliani and Miller's work on cost of capital, corporation valuation and capital structure determined that


\textsuperscript{11}David Durand, "Growth Stocks and the Petersburg Paradox," The Journal of Finance, 12 (September 1957), 362.
the value of an unlevered firm with no growth is the discounted value of a perpetual non-growing stream of net operating cash flows after tax. \[ V_U = \frac{E(\text{NOI})}{e} (1-t) \] , where \( E(\text{NOI}) \) is the expected net cash flow from operations which is adjusted to after tax flows by the term \( (1-t) \), and \( e \) is the discount rate for an all equity firm.\(^{12}\) \( e \) may be determined from the capital asset pricing model for the firm where \( K_u = R_F + B_j (K_m - R_F) \).

The value of a no growth levered firm is the value of an unlevered firm plus the present value of the interest tax shield. This is expressed as:

\[ V_L = V_U + t_c B \]  
\[ V_L = \frac{E(\text{NOI})}{e} (1-t) + \frac{rBt_c}{K_d} \]

\[ \frac{rBt_c}{K_d} = Br_c \] if \( r = K_d \)

where \( r_B \) is the tax shield provided by the debt and \( K_d \) is the current market rate of return for a risk-free debt stream.\(^{13}\)


\(^{13}\) Copeland and Weston, p. 277.
Assuming that \( r = K_d \) the value of a levered firm with constant growth is determined by the following equation:\(^{14}\)

\[
y^L = \frac{E(\text{NOI}) (1-t) (1-b) (1+g)}{e-g} + tB
\]

where:

\( E(\text{NOI}) = \) end-of-year expected net operating profits
\( e = \) the cost of equity capital for an all equity firm
\( B = \) market value of debt
\( b = \) retention rate
\( g = \) growth rate of dividends

The value of a levered firm with a period of super-normal growth is determined by the following equation:\(^{15}\)

\[
y^L = \frac{E(\text{NOI}) (1-t)}{e} + t_cB + K \left[ E(\text{NOI}) (1-t) \right] T \left[ \frac{r-k_o}{k_o(1+k_o)} \right]
\]

where:

\( E(\text{NOI}) = \) end-of-year expected net operating profits
\( e = \) the cost of equity capital for an all equity firm
\( B = \) market value of debt
\( K = \) investment rate


\(^{15}\)Copeland and Weston, p. 339.
T = the number of years \( r > k_o \)

\( k_o \) = weighted average cost of capital

\( r \) = the average rate of return on investment

This focuses on the items of relevant information for valuation, none of which is provided in the annual report of the firm. The relevant information is current market value of the debt, the percent of after tax cash flows from current projects retained for investment, the number of years supernormal growth is expected to persist, the expected rate of return on new investments, and the weighted average cost of capital for the firm.

Miller and Modigliani present a rigorous statement of the parts of the economic theory of valuation bearing directly on the matter of dividend policy. This extensive work contributed to the evolution of dividend models for valuation techniques.

**Discounted dividend models.** The discounted dividend models for these three previously discussed valuation techniques are as follows. The price for a share of stock of a no growth company is \( \frac{D}{K_j} \).

The Gordon equation for a constant growth firm is:

\[
P_o = \frac{D(1 + g)}{K - g}, \text{ where } g \text{ is the retention rate times the return}
\]

The valuation equation for a firm with supernormal growth followed by a period of constant growth is:

\[ P_o = \sum_{t=1}^{n} \frac{D_t}{(1+k_j)^t} + \frac{P_n}{(1+k_j)^n}, \text{ where } P_n = \frac{D_{n+1}}{k_j-g_m}, \]

where the present price \( P_o \) equals the present value of dividends during the supernormal growth period, plus the value of the stock price at the end of the supernormal growth period discounted back to the present. Where:

- \( k_j = \frac{d_1}{P_o} \), the capitalization rate
- \( n \) = the period of supernormal growth
- \( g_m \) = the normal growth rate
- \( D_t = d_0(1+g)^t \), where \( g \) = the expected growth rate

The history and development of the theory for present value models for stock price valuation is rich and ever developing. But this development has been relatively recent and the models provide approximation of value at best.

The dominant theoretical approach to equity valuation is that the current value of a stock is the present value of the discounted future cash flows expected to be received.

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18 Weston and Brigham, p. 689.
The theory of stock valuation has had a large influence on the development of practical stock valuation methods. In a study of seventy-five institutional investors and research firms, Hawkins and Campbell found in practice, to the extent formal present value method models were used, "dividend-oriented valuation approaches are the most popular" of the valuation models. They found the theoretical variations of the constant dividend growth rate model and the multi-period growth rate model have influenced practice, with the multi-period model being applied more frequently than the constant growth model. They suggested earnings-per-share growth rates and price-to-earnings ratios do not contradict the popularity of dividend oriented present value approaches because of the following reasons. EPS growth rates and assumed dividend payout ratios lead to projected dividend flows which create stock values. The expected EPS growth rate may be used instead of the expected dividend growth rate if the dividend payout ratio is constant. One may use a P/E analysis if the dividend model is properly understood.

21 Ibid., pp. 15-16.
This theoretical approach to equity valuation regards stock as a financial asset from which expected financial benefits will flow. These expected cash flows determine the expected stock price which can be compared with the current market price. Conceptually the purchase decision regarding a stock is very similar to a capital budgeting decision to purchase a piece of equipment. Both are purchased with an initial investment with the expectation of receiving future cash flows. Both are grouped in either a range of possible projects or a portfolio context. The value of a stock reflects the expected dividend cash flows to the current and future owners of it.

In the theoretical approach to stock valuation, the assumption is made that the only cash flow of general interest to investors is expected future dividends. The only exceptions to this are when the firm is sold to another, or is liquidated. Investor focus on dividends reached a high in the Spring of 1977.

The constant growth rate model of Gordon suggests that the expected price of a share of stock is the dividend received one year out divided by the difference between the

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23"More and More Firms Boost Dividends, Partly Due to Pressure from Shareholders," Wall Street Journal (May 18, 1977), p. 44.
investor's required rate of return and the projected annual constant growth rate of dividends. Investor differences of various investment opportunities, different risk levels, unique liquidity preferences and individual tax situations affect value through the required rate of return. The higher the risk, the higher the required rate of return.

A basic assumption of capital market theory is that future rates of return are a function of the risk assumed. Analysts who try forecasting returns compare their forecasts of expected return to what is suggested by the capital theory formulation to evaluate differences between their projection and the market risk indication.\(^{24}\) The calculation of the required rate of return for an individual stock considered as part of a diversified portfolio is the sum of the risk-free rate of return, plus the product of the stock's beta times the risk premium required by the investor to own a market portfolio of stock. By substituting actual stock price for expected price in the constant growth valuation model, the projected return is the product of the stock's dividend yield plus the expected dividend growth rate, \(K_p = \frac{D_1}{P_0} + g\). An expected earnings multiplier can be computed from the constant growth model by dividing the estimated dividend payout ratio one year out by the difference between the required rate of return.

\(^{24}\)Hawkins and Campbell, p. 27.
and the projected dividend growth rate \( P_o/E_1 = \frac{D_1/E_1}{k_{r-g}} \).  

As long as the dividend payout ratio remains constant, model users can substitute EPS growth rates for dividend growth rates and use P/E valuation approaches.

The multi-period growth rate model is used when dividends are expected to grow fast during the first period, followed with a period of constant growth in dividends. The present value of dividends paid in the initial period is added to the present value in the constant growth period to determine the expected stock price.

\[
P_0 = \sum_{t=1}^{\infty} \frac{D_0(1+g_n)^t}{(1+k_s)^t} + \frac{D_{n+1}}{k_n-g_n} \cdot \frac{1}{(1+k_s)^n}.
\]

**Practical applications of present value methods.** The basic tenets underlying all of the present value models are that stock value will rise if the investor's required rate of return decreases, if the expected growth rate of dividends increases, or if some combination of these improves the risk-reward relationship. Present value methods can be used to compute a theoretical price for an individual stock, to determine the number of years of dividend growth to where the investor's yield on the purchase

\[\text{Ibid., pp. 19-22.}\]

\[\text{Ibid., pp. 22-29.}\]
price equals the AAA bond rate, to determine a theoretical
P/E for the stock, to compute an implied or expected rate
of return, and to estimate a stock's alpha.\(^{27}\) Alpha is a
measure of the stock's expected rate of return when the
expected market rate of excess return is zero.\(^{28}\)

Several different valuation approaches using present
value calculations are used by institutional investors and
research firms. These approaches generally are based on
either constant growth rate, or multi-period growth rate
models, with the latter being most preferred. Individual
analysts tend to use the constant growth model because of
its simplicity and of its understandability to those
unfamiliar with equity valuation theory.\(^{29}\)

Hawkins and Campbell found Goldman Sacks & Co. using a
constant growth model to determine an allowable price-
earnings ratio which is the estimated year-end payout ratio
divided by the difference between the required rate of
return and the estimated dividend growth rate. The allow-
able P/E ratio is compared to the Dow Jones Industrial
Average and the Standard and Poors 500 stock price index
to determine whether the market is over or under priced,

\(^{27}\)Ibid., pp. 3-4.

\(^{28}\)Jerome B. Cohen, Edward O. Zinbarg, and Arthur
Zeikel, *Investment Analysis and Portfolio Management*, 3rd

\(^{29}\)Hawkins and Campbell, p. 32.
and what the potential is for future movement, given changes in interest rates, growth rates and payout ratios.30

Other analysts use the constant growth model as a crude risk measurement of focusing on crossover points. This is accomplished by figuring the number of years it takes for dividends to grow to where the yield on the stock is equal to the yield on quality long-term bonds purchased on the date of the stock purchase.31 The greater the number of years to the crossover point, the more attractive long-term bonds become. Some analysts use the constant growth model approach to valuation as a screening device, followed then by other valuation methods.32

Multi-period growth models are used for varying purposes with differing implementations. Hawkins and Campbell describe three present value valuation models they consider representative of multi-period dividend valuation models: theoretical price-earnings ratio, expected rate of return and expected future alphas.33 At the time of the Hawkins Campbell study, Kidder, Peabody & Co. determined a theoretical price-earnings ratio which was the sum of the

30Ibid., pp. 33-35.
31Ibid., p. 35.
32Ibid., p. 36.
33Ibid., pp. 37-46.
present value of a 10 year stream of constant growth dividends plus the present value of the share price expected at the end of the tenth year, divided by the current earnings per share assumption. The assumed price-earnings multiple used to discount the tenth year's earnings was determined by the reciprocal of the discount rate which was adjusted upward for faster growth and downward for slower growth. The key decision in the Kidder Peabody model was assigning a stock to a risk class. Risk was viewed here as a function of the confidence level for the estimated earnings growth rate and the payout rate. This was in preference to beta which was considered by them to vary too widely over time for enhanced predictability. This model provides a discipline and methodology for testing various assumptions. The weaknesses of the model are using absolute price-earnings instead of choosing terminal price-earnings multiples; and using earnings and price-earnings based models which some believe are not as useful any more.  

At the time of the Hawkins and Campbell study Wells Fargo Investment Advisors estimated the expected rate of return from owning a stock by the use of a present value multi-period dividend model. They used three periods: a five year period with a constant dividend growth rate, a period when dividend growth rate declines to where company

\[^{34}\text{Ibid., pp. 37-41.}\]
maturity occurs, and the period of maturity. A true dividend cash flow focus was maintained for determining terminal stock valuation. The expected rate of return was figured exactly as the internal rate of return for capital projects with uneven annual cash flows is determined. Comparing the average expected return from the five risk sectors with individual expected return for the stocks within each risk class sets up a measure of relative attractiveness, which was then adjusted for liquidity of the firm. The strength of this method is allowing for the union of future dividend streams and risk categories in a repeatable manner. One problem of this method is the use of very complicated algorithms in developing expected future betas.\textsuperscript{35}

At the time of the Hawkins Campbell study Bache, Halsey, Stuart, Inc. applied a stock valuation analysis using a multi-period present value dividend method which focused on expected future alphas instead of expected rates of return adjusted for risk and liquidity. Alpha is a measure of the stock's expected rate of return when the expected market rate of excess return is zero. The Bache model used three periods. Bache believed it is possible to construct a portfolio of positive alpha stocks, which positive aspect will not be eliminated by diversification.

\textsuperscript{35}Ibid., pp. 41-44.
The model determined an expected rate of return for each stock, a beta for each stock, the expected return for the Standard and Poors 500, and applying a value for the risk-free rate of return calculated an expected alpha for each security. Bache suggested a portfolio of positive alpha stocks would do better in any environment than other portfolios with similar risk.\textsuperscript{36}

In addition to the three representative present value stock valuation models and the constant dividend growth rate model, Hawkins and Campbell identified an earnings growth rate model used by First Boston Corporation which focused on a comparison of the implied risk premium over the risk-free rate of return and the distribution of the stock's past returns. A present value model was used to compute the implied risk premium. This was similar to the constant growth method of stock valuation with the exceptions that this model assumed arithmetic constant dollar growth each year and discounted a stream of earnings instead of a stream of dividends. First Boston rejected the dividend model because a negative theoretical price-earnings ratio appeared when the dividend growth rate was greater than the required rate of return and because of the illogical upward leverage on the P/E ratio when the spread between the dividend growth rate and the required rate of

\textsuperscript{36}\textit{Ibid.}, pp. 45-46.
return became very small. The risk premium was determined by subtracting the current AAA corporate bond rate from the implied rate of return. Comparisons were then made with the historical risk premium of an industry and with the current implied risk premium of the market as a whole. Industries with high risk premiums compared to the past signaled possible undervaluation. The strengths of this model are that it discounts earnings and it is a good indicator for focusing on desirable industries. The weaknesses are using earnings instead of dividends, using an arithmetic growth in earnings assumption, and it is too complicated for the value received.  

The data used in these present value models are taken from fundamental analysis which employs a substantial amount of past and projected financial statement data. Fundamental analysis influences investor judgement concerning the required rate of return. This dependence on financial statement data focuses on the need for financial reporting to provide information that is useful for making rational investment, credit and similar decisions.

The problem of annual accounting reports not providing relevant information for valuation is aggravated in industries where earnings poorly represent the basic

37Ibid., pp. 46-47.
38Ibid., p. 32.
economic characteristics of the industry. One such industry is oil and gas producing companies where cost of existing oil and gas reserves is not a relevant indicator of either cash inflows from production or cash outflows necessary to replace those reserves. Expected cash inflows could be determined from some estimate of present value of proved developed reserves on hand. Proved undeveloped reserves and probable reserves may be relevant in determining valuation of oil and gas producers.

Relative value comparisons. The most popular method used by institutional investors and researchers evaluates the stock's current price-earnings ratio relative to the past multiple of the stock on the market, to selected financial ratios, or to earnings and dividend growth rates. These relative value comparisons rely heavily on past performance and say little about a stock's projected cash flows to investors or the rate of return required by them. In the past, the current P/E multiple was compared to its past P/E multiple. Currently this comparison is made in terms of the stock's current and past multiples compared to current and past earnings multiples for the market. However because earnings no longer represent distributable

income and because investor attitudes toward risk management have changed, relative price-earnings methods of valuation appear to be declining in popularity. The Accounting Principles Board and more recently the Financial Accounting Standards Board have issued many new standards which mean that earnings determined in the past by generally accepted accounting principles may no longer be directly comparable to earnings determined from current principles. Investor's attitudes toward the ability to sustain high earnings growth and toward the definition of acceptable risk premium have changed. These attitude changes resulted in investors wanting higher premiums and rejecting high growth rate projection, both of which mean they are less willing to pay high multiples for stocks. This renders comparing current and past multiples less useful. However individual analysts almost universally use some form of relative price-earnings analysis as a convenient historical summary rather than principal input for investment decision making.

One of the earlier applications for determining relative value was by Whitbeck and Kisor who demonstrated that relative price-earnings ratios depend on the expected

\[ \text{\footnotesize \cite{GoodMeyer1973}} \]

\[ \text{\footnotesize \cite{HawkinsCampbell1974}} \]

\[ \text{\footnotesize \cite{GoodMeyer1973}} \]

\[ \text{\footnotesize \cite{HawkinsCampbell1974}} \]
growth in earnings, an estimation of risk and the dividend payout ratio.\textsuperscript{42}

Hawkins and Campbell review a relative value analysis service provided by Donaldson, Lufkin and Jenrett Securities Corporation as representative of a relative value method of analysis. This service provides charts for about seventy industry classifications and about two hundred forty-five individual stocks of the three hundred eighty stocks used to prepare the industry charts. The charts display data relative to the S&P 500 data. The charts plot relative price-earnings ratio, relative return on owner's equity, relative dividend yield, relative price, and relative earnings per share for the current year, eight previous years, and the next year forecasted. Each set of charts has a histogram detailing the frequency distribution of the stock's historical price-earnings ratios. Three basic steps are employed in using the charts. A determination is made of whether the relative P/E on projected earnings is inflated or depressed by historical standards. Possible improvement or deterioration is tested by comparing the stock's projected relative return on equity with the median relative return. The company's risk and quality characteristics are reviewed. This approach

focuses the analysis on the company's stock price and return on equity in an historical market context. This data should be used with fundamental analysis and projections before risk and opportunity can be defined. Mitchell, Hutchins, Inc. (since merged with Paine Weber Jackson & Curtis) prepared a presentation that centers on the relationship between relative price-earnings ratios and expected growth rate in earnings per share.

Some institutional investors apply firm-wide relative price-earnings valuation techniques somewhat differently than the one just described. One firm studied establishes a range for the price-earnings ratio for the S&P 500 one year ahead. Each analyst sets a relative price-earnings number for his industry or set of companies. The target price is determined by multiplying the market price-earnings per share times the relative price-earnings number. Another firm determines a relative price-earnings range based on the past five years with the most recent years weighted more heavily. A sample of earnings per share estimates for next year is multiplied by the range to set a target price range. Another system

43 Hawkins and Campbell, pp. 59-64.
44 Ibid., pp. 64-68.
45 Ibid., p. 68.
46 Ibid.
focuses on a company's relative price-earnings ratio and relative growth rate, classifies the companies into four subdivisions, compares the price-earnings ratio with the growth rate, and determines how many years of above average growth are necessary to amortize the price-earnings premium. The stocks are then ranked by the number of years to earn the price-earnings premium.47 Still another system using relative price-earnings ratios is employed by the Spencer Trask reserve group. A relative multiple history of a stock is matched with a model of the market based on estimated future interest rates to get a forecast of the stock's future multiple range under simulated market conditions. A review of the company is then made to determine any change in the company fundamentals that would affect historical price-earnings based projection.48

There have been many articles on the advantages and disadvantages of relative valuation methods. The few relative valuation models presented here are intended to simply give an awareness of various aspects of relative valuation and are not intended to be an all-inclusive of the available literature.

In the early 1970's, Ralph Bing conducted a survey to determine the valuation methods most popular with financial

47Ibid., p. 69.
48Ibid.
analysts. Of the seven techniques listed, he found the multiplier appraisal techniques enjoying overwhelming popularity with practitioners. The two methods using present value techniques were all but ignored. He cited one reason for this being an emphasis on relatively short-range performance and on appraisal methods suited to the short-range focus. 49

Several studies attempted to determine the relationship between multiples, earnings or growth with future price movements. Extending the research performed by Ball and Brown, 50 Basu investigated the effect of earnings yields of corporate equities on the association between annual income numbers and security prices. 51 Proponents of the price-ratio hypothesis claim that E/P ratios are indicators of the future investment performance of securities and investor expectations. The degree of association between scaled accounting income numbers and security prices was more pronounced for high E/P securities.


that have experienced a positive change in income than for low E/P securities. If the two parameter model Basu used did not completely reflect the equilibrium risk return relationships, earnings yield would become a proxy for omitted risk variables. The E/P ratio should permit a better assessment of relative risks of equities, to the extent earnings yields are surrogates for omitted risk parameters. 52 Leonard Zacks found no relation between forecasted EPS growth and actual price movement in his 1976 study of two hundred sixty S&P companies, which compared forecasted EPS growth with actual EPS growth. He concluded that selection must be based on anticipated changes in the consensus rather than changes in earnings. 53 Beaver and Morse were concerned about the ability of past growth to explain differences in P/E ratios. They grouped stocks into twenty-five portfolios and computed P/E ratios for each stock for each year from 1956 through 1974. Initial P/E differences among the portfolios persisted for up to fourteen years, but growth explained little of these differences. Market risk was also of little assistance in explaining the persistence in P/E ratio differences over periods of greater than three years. They concluded the

52 Ibid., p. 618.

differences in accounting methods are most likely to explain the persistence of differences in P/E ratios, rather than growth or risk factors.  

Differences of opinion exist as to the role of earnings in the valuation process. Fischer Black believes users of financial statements really want an earnings figure that measures value, not changes in value. He believes analysts want an earnings figure they can multiply by a standard P/E ratio to arrive at an estimate of the firm's value.  

Leopold Bernstein defends fundamental analysis by suggesting it is valid when applied to the earnings and financial risk components of security price, but not when evaluating external influences on the P/E ratio. The P/E ratio is affected by internal factors, but greatly affected by money supply, general business and credit conditions, and general level of confidence. But fundamental factors affecting the company lend themselves to a much more detailed, disciplined and systematic analysis than analysis of the external environment. Fundamental analysis of financial statements establishes a link with the economic realities of the company and can reduce

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the likelihood of future surprises. Information may be readily available for analysis, but publication of an interpretation of old and known information may result in sudden price adjustments to the newly perceived outlook. There is a difference between information and a proper interpretation of such data. The efficient market hypothesis advocates do not claim fundamental analysis is a worthless effort, but use all means at their disposal to identify market inefficiencies. Lorie and Hamilton take a different view by stating, "the most general implication of the efficient market hypothesis is that most security analysis is logically incomplete and valueless."

Joel Stern places relative valuation in its proper perspective with financial theory. He suggests that even though EPS is easy to understand and simple to calculate, it should not be used as an analytical device. It confuses investment decisions with financing decisions and thus is misleading in making decisions on acquisition, financing and capital structure planning. He suggests that investors don't discount earnings, but do discount


57 Ibid.

anticipated earnings net of capital required to be invested in order to maintain an expected rate of growth in profit, which he calls the Free Cash Flow method. He defines free cash flow as the function of net operating profit after taxes, new capital invested, the expected rate of return on new capital invested, the length of time this is expected to exist, the degree of business risk associated with the product lines, and the income tax savings provided by debt financing. He suggests these six variables account for all systematic price changes. He concludes that an EPS criterion for corporate policy can severely misallocate resources and adversely affect the company's shareholders.  

Asset valuation models. In contrast to focusing on cash flows in terms of a stream of dividends plus proceeds from the sale of the stock which leads to analysis of earning power, dividend paying ability and current market conditions, a small group of analysts concentrate on identifying stocks that can be purchased below the book value per share, the net current asset value per share, and sometimes below the cash value per share. They consider earnings and dividends only of minor importance. Book value per share is their principle guideline for investment. The intrinsic value approach is generally attributed to

Benjamin Graham, who in his many writings, recommended buying stocks with low debt to equity ratios, low P/Es, prices below book value and if possible below net tangible asset value. The Value Line Investment Survey lists stocks selling at a discount from liquidation value. Forbes publishes a list of "Loaded Laggards" which often includes companies selling at or near book value. Hawkins and Campbell identify three approaches to book value investment strategy as asset analysis focus, asset valuation service, and intrinsic value and margin of safety.

Asset Analysis Focus (AAF) is a division of Moore & Schley, Cameron & Co. It publishes a list of companies selling below liquidation value which requires making value determinations beyond balance sheet data. For example, real value of an oil and gas producer's proved, probable and possible reserves may be substantially different from the stated book value of proved reserves. AAF defines "net net working capital" as current assets less all liabilities senior to the common equity.

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61 Hawkins and Campbell, pp. 73-74.
Purchasing a stock at less than the net net working capital per share in effect is a purchase only of the current assets and thus receiving all fixed assets at no cost. This method provides a unique understanding of the intrinsic value of the company.62

Asset Valuation Service of Wood, Struthers & Winthrop Inc. focuses on corporate assets and the expected return that might be made if the entity were purchased, as well as on the company's current and future earnings potential. They select companies where the stock price is less than net tangible assets, a P/E ratio of less than eight, an historic average earnings return of more than twelve percent, positive earnings for the last five years, a positive growth in book value per share for the last five years, and positive current and future earnings potential. A subjective rating scale is used which is composed of return values, balance sheet values and operating records. However a high rating does not necessarily suggest a recommendation to buy.63

Tweedy, Braune, Inc. emphasizes a net asset value approach based on intrinsic value and margin of safety. Intrinsic value focuses on the realization value through sale or merger, and the value placed on earnings power and

62 Ibid., pp. 75-76.
63 Ibid., pp. 76-77.
financial strength. The margin of safety is the discount from intrinsic value at which stock may be purchased. They use four methods of analysis to figure intrinsic value: net current asset method, hidden asset method, business value method and arbitrage method. The net current asset method determines value by subtracting all liabilities senior to common stock, long term debt, preferred stock, capitalized lease obligations and certain pension liabilities from current assets. The hidden asset method identifies assets not stated at current values and adjusts them to current market value in calculating value. Some examples of hidden assets are real estate, coal, oil, timber, and inventory reserves resulting from LIFO inventory accounting. The business value method focuses on historical earning power, present product market position, and financial strength which is compared to similar firms purchased or merged in the recent past. The arbitrage method identifies likelihood of acquisition or liquidation and assesses the risk-reward potentials of these investments.64

Sustainable growth rate. The primary unknown variable in all equity valuation models and in some of the relative price-earnings valuation models is either the projected

64Ibid., pp. 78-79.
growth rate of dividends or the projected growth rate of earnings. Some analysts think stock price fluctuations are closely related to earnings changes. Fundamental analysis of financial statement data and related supplementary disclosures is used in developing these estimates. The sustainable growth rate equation is used in practice to tie together much of the historical and proforma fundamental growth rate analysis.\textsuperscript{65}

The sustainable growth rate equation states that the annual net income growth rate is equal to the rate of return on beginning of the year net worth times one minus the annual dividend divided by annual earnings. The equation is based on future earnings growth rate as a function of future return on equity and of dividend payout policy, if the firm issues no new equity. The future earnings growth rate cannot be greater than the firm's beginnings return on equity when there are no dividends paid. The equation shows that a variety of combinations of returns of equity and dividend payout levels can be used to maintain a given earnings growth rate. Actual earnings growth rate may differ from the results of the equation for four reasons. The actual return on equity and the actual


\textsuperscript{66}Hawkins and Campbell, p. 80.
dividend payout rate may differ from those used in the equation. If the industry growth rate is less than the firm's growth rate, the firm cannot increase its market share and the industry growth rate will predominate. Issuing new equity will affect earnings growth in the year of issue and earnings growth will be greater than the projected growth.67

In practice the sustainable growth rate analysis is expanded to determine the sources of growth. The DuPont formula is usually used to determine return on equity as the product of the pretax profit margin on sales times the asset turnover ratio times the financial leverage ratio times the tax retention (1-tax rate). This provides analysts the tools to focus on ratios relating to operations and ratios relating to financing. The sustainable earnings growth rate and the DuPont formula can be combined by multiplying the DuPont formula by the profit retention. If the dividend payout rate remains constant, this method may be used to determine the sustainable growth rate for dividends as well as for earnings. Combining the two formulas provides perspective on how the growth rate was achieved and on the risk associated with it. This gives investors a more informed basis to

67Ibid., pp. 82-83.
determine the required rate of return for the investment.\footnote{Ibid., pp. 87-88.} 

Some variations occur in practice in applying the DuPont formula. If the analyst is interested in how the firm uses its permanent capital, the turnover and leverage ratios are determined by using long-term capital instead of total liabilities. Some analysts use pretax income plus interest charges for the numerator or the margin ratio rather than income before taxes to determine a pure operating margin ratio. This is also applied to return on assets.\footnote{Ibid., p. 88.}

The expanded sustainable earnings growth rate equation focuses on the need for financial statement data that is a relevant indicator of cash flows from production. In industries such as the oil and gas production industry, cost of existing oil and gas reserves as stated in the basic financial statements is not a relevant indicator of either cash inflows from production and sale of reserves, or cash outflows necessary to replace those reserves.\footnote{Financial Accounting Standards Board, "Disclosures About Oil and Gas Producing Activities," Proposed Statement of Financial Accounting Standards (Stamford, Connecticut, April 1982), p. 29.} Historical cost financial statements of oil and gas producers are deficient for assessing timing, amounts and uncertainty of expected net cash flows to the company.
Financial profile evaluations. The problem of earnings not being as closely related to distributable income as in the past has focused analysts' attention to capital expenditure requirements, debt levels, and liquidity in order to assess the dividend potential of earnings. Many have met this need by concentrating on funds flow statements with a cash orientation. The data in these cash analyses are essentially those found in the changes in financial position format required by APB Opinion No. 19 but are presented in a format that highlights ability to finance fixed assets with internally generated funds, dependency on external sources of financing, effect of this dependency on shareholder interest, and effects of the financial profile on dividend payout. Under-depreciation causing overstated profits on which high income taxes are paid, along with insufficient retained earnings and distorted balance sheets have created an unjustified sense of well-being. A study by Norman Weignier of Oppenheimer & Co., Inc. of 364 companies from 1965 to 1974 found increased reliance on financial leverage; greater illiquidity; decreasing depreciation charges relative to capital expenditures; greater reliance on deferred taxes as a source of funds; a higher percentage of

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earnings used to finance capital expenditures; increased inventories; declining acid test ratios and equity to asset ratios; and increased return on tangible equity by using leverage, and understatement of depreciation and cost of sales. A cash analysis would help identify liquidity restrictions and heavy reliance on external financial needs.\textsuperscript{72}

At the time of the Hawkins and Campbell study Oppenheimer & Co., Inc. used a funds-type analysis to put current income statements in perspective. Wide fluxuations in unfunded pension liability, and large differences between capital expenditures and annual depreciation charges rendered an earnings figure misleading. Oppenheimer defined internally generated funds as net income plus depreciation, amortization and changes in deferred taxes. Drexel Burnham Lambert started with this figure and adjusted for changes in working capital which require or provide financing, and identify external financing used. Faulkner, Dawkins & Sullivan used a slightly different funds analysis format that distinguishes between operating and financing flows of funds, and was principally concerned with the degree to which a firm is self financing.\textsuperscript{73}

\textsuperscript{72}Hawkins and Campbell, pp. 99-105.

\textsuperscript{73}Ibid., pp. 100-108.
Other financial profile evaluations are used. At the time of the Hawkins and Campbell study Kidder, Peabody & Co. used a replacement cost funds approach to evaluate dividend viability. This excess cash flow analysis assisted their analysts in applying their equity valuation methods by further appraisal of normalized earnings dividend viability and estimated long-term growth rate. Emphasis on cash flow and cash needs is closer to the reality of business than is the basic financial statement approach. Donaldson, Luskin & Jenerett applied a Zeta score from a multivariate financial ratio-discriminate model as a measure of financial risk for investors, particularly a measure of credit-worthiness of a firm. The model weighed and summed seven financial variables and a constant to determine a score for the linear equation. The financial data were adjusted before computing the financial variables. The objective was to identify an important negative change in the financial profile of the company which fundamental analysis or beta analysis might miss. Cyrus J. Lawrence, Inc. used a plowback multiple in its financial profile evaluation approach which it called comparative valuation. It was comprised of two factors called relative valuation and fundamental momentum.

74Ibid., pp. 110-113.
75Ibid., pp. 114-118.
The plowback multiple represented the price placed on a firm's internally generated growth. Plowback multiples for a firm were compared to the plowback multiple of the Dow Jones Industrial Average to determine relative valuation. Fundamental momentum ranked the trend of the firm's fundamentals.76

These funds statement models evolved out of the same concerns that paved the way for wider use of funds statements. These concerns are the ability of a company's internally generated cash to finance capital investments; the company's reliance on external funds; and the effects of liquidity, self financing ability, and potential borrowing capacity on dividend payout.77 Basic financial statements of oil and gas producing companies give little information on which to make these determinations.

Financial theory has been closely followed by the practical valuation models of the present value method, the relative value method and the net asset value method. All present value methods and some relative value methods depend on the projected growth rate of dividends or earnings which can be evaluated by combining the sustainable growth rate equation with the DuPont formula. Once the projected growth rate has been determined, an evaluation

76Ibid., pp. 119-120.
77Ibid., p. 120.
of the ability to finance this growth must be made. Funds statements focusing on internally generated cash for capital investments, reliance on external funds, the position of liquidity and potential borrowing capacity are useful in this regard. Basic historical-cost based financial statements provide only some of the data on which these determinations can be made. Oil and gas reserves may have a real asset value substantially different from the stated book value. There is no relationship between historical cost expenditures and the value of the oil and gas reserves derived from those expenditures.
CASE I

Determine the expected stock price using the method of valuation you routinely apply. Please describe your method below by answering the questions listed for the valuation method used, be it present value of future dividends, cash flows or earnings; relative value analysis; or net asset valuation. If your valuation method combines any of these three methods, please complete the questions for each method used and indicate the manner of the combination in the other method section (IV). If your valuation method is different from the three listed valuation methods, please describe and define it in question IV.

I. Present value methods

A. The Constant Growth Model

1. The constant growth rate method gives an expected stock price of ________ per share.

Using forecasted year-end dividends per share of ________, determined as follows:

Or using forecasted earnings per share of ________, determined as follows:

Or using forecasted cash flows per share of ________, determined as follows:

And using a discount rate of _____%, comprised of a risk-free rate of _____%, and a premium of ________ over the risk-free rate. The risk-free and premium rates are determined as follows:
And using a projected constant dividend growth rate of _____%,
determined as follows:

B. Multi-period Growth Rate Models

1. The dividend approach of the multi-period growth rate model
gives a stock price of ______ per share.

Using a current dividend flow of ______ per share,
determined as follows:

For _____ years of initial growth;
And an assumed constant growth rate of dividends in the initial
period of _____%, determined as follows:

And an investor's required rate of return in the initial
period of _____%, determined as follows:

This gives a present value of dividends during the initial
growth period of ______ per share.

Using an investor's required rate of return in the final
period of _____%, determined as follows:

And an assumed constant growth rate of dividends in the final
period of _____%, determined as follows:

This gives a present value at the end of the initial growth
period of ______ per share.
2. The earnings approach of the multi-period growth rate method gives a stock price of ______ per share.

Using the expected level of after-tax earnings (or cash flows) of ______ from investments currently in place, determined as follows:

Using a discount rate of ____% to capitalize these earnings from current investments, determined as follows:

Using the value added by the tax deductible portion of the present value of the debt of ______, determined as follows:

Using ____% of expected after-tax cash flows from current projects retained for investment;

Using ______ years of supernormal growth;

Using an expected rate of return on new investments of ____% determined as follows:

Using the weighted average cost of capital for the firm of _____% determined as follows:

C. Other present value method if routinely used, please describe and define assumptions:
D. Information used in determining value:
   _____ a. primary (historical cost-based) financial statements.
   _____ b. ratios. Please indicate the ratio(s) used:

II. Relative value method

Relative value analysis gives an expected stock value of ______ per share.

Using a projected company return on equity of ______%.

Using expected pretax profit of ______ and expected sales of ______ to get an expected margin of ______.

Using expected sales of ______ and expected assets of ______ to get a turnover of ______.

Using expected assets of ______ and expected equity of ______ to get leverage of ______.

Using a tax retention (1 - tax rate) of ______.

Using a profit retention (1 - payout) of ______.

Using a projected company current ratio of ______

Using an expected company price-earnings ratio of ______

Using an expected S & P 500 price-earnings ratio of ______

Using an expected S & P crude oil producers index of ______

Please describe and explain assumptions and calculations made:
Information used in determining value

____ a. primary (historical cost-based) financial statements
____ b. ratios. Please indicate the ratio(s) used:

III. Asset valuation method

Asset valuation analysis gives an expected stock price of ________ per share.
Using a book value of ________ per share determined by:

Using a liquidation value of ________ per share determined as follows:

Using a cash value per share of ________ determined as follows:

Using a replacement cost of ________ per share determined by:

Using an intrinsic value of ________ per share which would accrue through sale or merger as a continuing business, determined as follows:

Other method or factor used in asset valuation, please describe and explain assumptions:
Information used in determining value:

_____ a. primary (historical cost-based) financial statements
_____ b. ratios. Please indicate the ratio(s) used:

IV. Other method you routinely use, given a stock price of ______ per share,

On the basic assumptions of:

Please briefly describe your method:

Information used in determining value:

_____ a. primary (historical cost-based) financial statements
_____ b. ratios. Please state the ratio(s) used:
A Perspective

This publicly traded company is engaged in oil and gas exploration and production, transmission and gas processing, and realty operations. Earnings this year set the 12th consecutive year of record growth. The oil and gas exploration division experienced a 39% increase in natural gas prices and a 14% increase in gas production this year, which partially reflects the company's capabilities in tight formation technology. Crude oil and condensate production was up 14% but prices stayed flat. Reserves of liquid hydrocarbons and natural gas showed good increases. The drilling and oilfield supply division also contributed to earnings.

The transmission and processing division experienced new production and price records for natural gas. But, it was hit by the decline in demand due to the recession and consumer energy conservation which lowered prices for natural gas liquids. Such cyclical moves are normal in the gas liquids industry and price recovery is expected in later 1983. The gathering, transmission and marketing of natural gas had a fine year, as did the real estate division.

The possibility of changes in the Natural Gas Policy Act makes forecasting the effects from these changes uncertain at best. Decontrol of wellhead natural gas price would have a favorable effect on natural gas production and a temporarily negative effect on the natural gas liquids business.

The current budget reflects a conservative approach because of uncertainties in the economy, the cost of money and the abundant supply of available petroleum. This will improve the balance sheet by reducing the rate of increase in the company's borrowings and interest costs. If interest rates decline as expected, fixed rate financing will be substituted for some of the revolving lines of credit now in place. Drilling will be concentrated in areas of excellent chance for adding to reserves, and desirable lease acreage will be acquired. The company has tightened its belts and taken steps to avoid a buildup in staff and facilities, as well as in capital and expense commitment beyond what is necessary to do the job.

The company has good management with adequate depth. It also has a capable exploration department with successful track records in Texas, Louisiana, California and Wyoming.
CONSOLIDATED BALANCE SHEETS
January 31, 1982 and 1981 (in thousands)

<table>
<thead>
<tr>
<th>Assets</th>
<th>1982</th>
<th>1981</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Assets:</td>
<td></td>
<td></td>
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<tr>
<td>Cash</td>
<td>46,239</td>
<td>15,816</td>
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<tr>
<td>Temporary cash investments</td>
<td>5,986</td>
<td>23,300</td>
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<tr>
<td>Trade receivables</td>
<td>162,622</td>
<td>124,824</td>
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<tr>
<td>Inventories</td>
<td>76,196</td>
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<td>Other</td>
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<td>3,767</td>
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<tr>
<td>Total current assets</td>
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<td>194,434</td>
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<td>Property, Plant and Equipment, at cost</td>
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<tr>
<td>Oil and gas properties, full cost method</td>
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<tr>
<td>Costs being amortized</td>
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<td>Costs not being amortized</td>
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<tr>
<td>Gas processing and transmission facilities</td>
<td>299,769</td>
<td>200,685</td>
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<tr>
<td>Other</td>
<td>108,877</td>
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<tr>
<td>Less accumulated depreciation, depletion</td>
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<td>190,005</td>
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<tr>
<td>and amortization</td>
<td>997,104</td>
<td>643,458</td>
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<tr>
<td>Realty Assets, at cost, substantially all</td>
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<td>pledged</td>
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<tr>
<td>The Project</td>
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<td>Real estate held for investment,</td>
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<td>development and sale</td>
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<td>Notes and contracts receivable</td>
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<td>400,120</td>
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<td>Investments and Other Assets</td>
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<td>10,466</td>
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Liabilities and Stockholders' Equity

<table>
<thead>
<tr>
<th>Liabilities and Stockholders Equity</th>
<th>1982</th>
<th>1981</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Liabilities:</td>
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<td></td>
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<tr>
<td>Current maturities of long-term debt</td>
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<td>Oil and gas proceeds payable</td>
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<td>Accounts payable</td>
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<td>Accrued liabilities</td>
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<tr>
<td>Total current liabilities</td>
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<td>161,256</td>
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<tr>
<td>Long term debt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unsecured revolving line of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>credit with ten banks, convertible to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>four-year term note</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other unsecured lines of credit</td>
<td>243,000</td>
<td></td>
</tr>
<tr>
<td>with banks, convertible to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>three-year term notes</td>
<td>190,000</td>
<td></td>
</tr>
<tr>
<td>Insurance company notes secured by</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P,PE of $5,000,000 payable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>semiannually to 1/90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notes and capitalized equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lease obligations to banks and others</td>
<td>30,304</td>
<td></td>
</tr>
<tr>
<td>Less current maturities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Realty Liabilities</td>
<td>22,727</td>
<td></td>
</tr>
<tr>
<td>Other Liabilities and Deferred</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credits:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deferred Federal Income taxes</td>
<td>265,372</td>
<td>183,456</td>
</tr>
<tr>
<td>Revenues subject to refund</td>
<td>12,661</td>
<td>10,493</td>
</tr>
<tr>
<td>Other</td>
<td>6,046</td>
<td>9,330</td>
</tr>
<tr>
<td>Total</td>
<td>284,079</td>
<td>203,289</td>
</tr>
</tbody>
</table>

Stockholders' Equity

<table>
<thead>
<tr>
<th>Stockholders' Equity</th>
<th>1982</th>
<th>1981</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common stock, $10 par value,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 million shares, 48 million</td>
<td></td>
<td></td>
</tr>
<tr>
<td>shares issued in '82 and 36 million</td>
<td></td>
<td></td>
</tr>
<tr>
<td>shares issued in '81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional paid in capital</td>
<td>4,822</td>
<td>3,623</td>
</tr>
<tr>
<td>Retained earnings</td>
<td>20,025</td>
<td>21,117</td>
</tr>
<tr>
<td>Less treasury stock at cost</td>
<td>11,802</td>
<td>11,802</td>
</tr>
<tr>
<td></td>
<td>385,174</td>
<td>284,348</td>
</tr>
<tr>
<td></td>
<td>1,699,333</td>
<td>1,180,144</td>
</tr>
</tbody>
</table>
CONSOLIDATED STATEMENTS OF EARNINGS

For the years ended January 1982 and 1981 (in thousands)

<table>
<thead>
<tr>
<th></th>
<th>1982</th>
<th>1981</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exploration and production</td>
<td>366,534</td>
<td>245,716</td>
</tr>
<tr>
<td>Transmission and processing</td>
<td>628,286</td>
<td>402,830</td>
</tr>
<tr>
<td>Realty operations</td>
<td>70,025</td>
<td>47,498</td>
</tr>
<tr>
<td></td>
<td>994,819</td>
<td>648,546</td>
</tr>
<tr>
<td></td>
<td>1,064,844</td>
<td>696,044</td>
</tr>
<tr>
<td>Costs and Expenses:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exploration and production</td>
<td>166,947</td>
<td>111,959</td>
</tr>
<tr>
<td>Transmission and processing</td>
<td>474,774</td>
<td>272,088</td>
</tr>
<tr>
<td>Realty operations</td>
<td>46,522</td>
<td>35,477</td>
</tr>
<tr>
<td>Depreciation, depletion, and amortization</td>
<td>95,832</td>
<td>55,357</td>
</tr>
<tr>
<td>Operating Earnings</td>
<td>784,075</td>
<td>474,881</td>
</tr>
<tr>
<td></td>
<td>280,769</td>
<td>221,163</td>
</tr>
<tr>
<td>Other (Income) Expense:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General and administrative</td>
<td>41,809</td>
<td>29,605</td>
</tr>
<tr>
<td>Interest -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expense</td>
<td>107,749</td>
<td>54,062</td>
</tr>
<tr>
<td>Capitalized</td>
<td>(41,479)</td>
<td>(23,570)</td>
</tr>
<tr>
<td>Income</td>
<td>(8,225)</td>
<td>(4,960)</td>
</tr>
<tr>
<td>Other</td>
<td>(3,747)</td>
<td>1,278</td>
</tr>
<tr>
<td>Earnings Before Federal Income Taxes</td>
<td>96,107</td>
<td>58,415</td>
</tr>
<tr>
<td></td>
<td>184,662</td>
<td>164,748</td>
</tr>
<tr>
<td>Federal Income Taxes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>(12,471)</td>
<td>2,532</td>
</tr>
<tr>
<td>Deferred</td>
<td>81,916</td>
<td>61,581</td>
</tr>
<tr>
<td></td>
<td>69,445</td>
<td>64,213</td>
</tr>
<tr>
<td>Net earnings</td>
<td>$115,217</td>
<td>$100,535</td>
</tr>
</tbody>
</table>
CONSOLIDATED STATEMENTS OF CHANGES IN FINANCIAL POSITION

For the Years Ended January 31, 1982 and 1981 (in thousands)

<table>
<thead>
<tr>
<th>Source of Funds:</th>
<th>1982</th>
<th>1981</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operations -</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net earnings</td>
<td>$115,217</td>
<td>$100,535</td>
</tr>
<tr>
<td>Depreciation, depletion and amortization</td>
<td>95,832</td>
<td>55,357</td>
</tr>
<tr>
<td>Deferred Federal income taxes</td>
<td>81,916</td>
<td>61,681</td>
</tr>
<tr>
<td>Cost of realty assets sold</td>
<td>16,627</td>
<td>12,325</td>
</tr>
<tr>
<td>Other</td>
<td>(10,484)</td>
<td>(719)</td>
</tr>
<tr>
<td><strong>Total from operations</strong></td>
<td>299,108</td>
<td>229,179</td>
</tr>
<tr>
<td><strong>Long term liability additions -</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long term debt</td>
<td>264,739</td>
<td>105,938</td>
</tr>
<tr>
<td>Realty notes payable</td>
<td>49,698</td>
<td>91,057</td>
</tr>
<tr>
<td>Issuance of treasury stock</td>
<td>5,000</td>
<td>5,327</td>
</tr>
<tr>
<td>Other</td>
<td>5,135</td>
<td>6,274</td>
</tr>
<tr>
<td><strong>Total source of funds</strong></td>
<td>623,681</td>
<td>437,775</td>
</tr>
</tbody>
</table>

| Application of Funds:                 |         |         |
| **Capital additions**                 |         |         |
| Property, plant and equipment         | 449,149 | 301,542 |
| Realty assets                         | 82,084  | 74,729  |
| **Long-term liability payments**      |         |         |
| Long-term debt                        | 23,648  | 11,759  |
| Realty notes payable                  | 15,092  | 21,869  |
| Issuance of treasury stock            | 5,002   | 10,826  |
| Cash dividends                        | 11,496  | 6,291   |
| Other                                 | 2,228   | 7,618   |
| **Total application of funds**        | 588,699 | 434,634 |

| Increase (Decrease) in Working Capital| $ 34,982| $ 3,141 |

<table>
<thead>
<tr>
<th>Increase (Decrease) in Components of Working Capital</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash and temporary cash investments</td>
<td>$ 13,169</td>
<td>$ 11,364</td>
</tr>
<tr>
<td>Trade receivables</td>
<td>37,798</td>
<td>46,255</td>
</tr>
<tr>
<td>Inventories and other current assets</td>
<td>50,614</td>
<td>12,799</td>
</tr>
<tr>
<td>Current maturities of long-term debt</td>
<td>(5,412)</td>
<td>(545)</td>
</tr>
<tr>
<td>Oil and gas proceeds payable</td>
<td>(18,978)</td>
<td>(23,194)</td>
</tr>
<tr>
<td>Accounts payable and accrued liabilities</td>
<td>(42,209)</td>
<td>(43,538)</td>
</tr>
<tr>
<td><strong>Increase (Decrease) in Working Capital</strong></td>
<td>$ 34,982</td>
<td>3,141</td>
</tr>
<tr>
<td>Working Capital, beginning of year</td>
<td>13,178</td>
<td>10,037</td>
</tr>
<tr>
<td>Working Capital, end of year</td>
<td>$ 48,160</td>
<td>$ 13,178</td>
</tr>
</tbody>
</table>

The preceding statements have received an unqualified auditor's opinion.
HISTORICAL COST RATIOS*
For the years ended January 31

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Profitability Ratios</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Earnings per share</td>
<td>$2.41</td>
<td>$2.09</td>
<td>$1.27</td>
<td>$0.68</td>
<td>$0.67</td>
</tr>
<tr>
<td>B. Dividends per share</td>
<td>.24</td>
<td>.13</td>
<td>.06</td>
<td>.03</td>
<td>.02</td>
</tr>
<tr>
<td>C. Return on total assets</td>
<td>6.8%</td>
<td>8.0%</td>
<td>10.3%</td>
<td>8.6%</td>
<td>5.9%</td>
</tr>
<tr>
<td>D. Return on shareholders' equity</td>
<td>29.7%</td>
<td>34.2%</td>
<td>42.0%</td>
<td>34.3%</td>
<td>22.8%</td>
</tr>
<tr>
<td>E. Year-end stock price</td>
<td>19-3/8</td>
<td>49-1/2</td>
<td>40-1/8</td>
<td>17-7/8</td>
<td>29-1/8</td>
</tr>
<tr>
<td>F. P/E ratio</td>
<td>8</td>
<td>23</td>
<td>31</td>
<td>26</td>
<td>43</td>
</tr>
<tr>
<td>G. Dividend yield</td>
<td>1.2%</td>
<td>0.26%</td>
<td>0.15%</td>
<td>0.17%</td>
<td>0.07%</td>
</tr>
<tr>
<td><strong>Liquidity Ratios</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. Current ratio</td>
<td>1.19</td>
<td>1.07</td>
<td>1.10</td>
<td>1.17</td>
<td>1.20</td>
</tr>
<tr>
<td>I. Quick ratio</td>
<td>0.99</td>
<td>0.93</td>
<td>0.99</td>
<td>1.00</td>
<td>0.98</td>
</tr>
<tr>
<td><strong>Leverage Ratios</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J. Total liabilities to total assets</td>
<td>77%</td>
<td>76%</td>
<td>75%</td>
<td>79%</td>
<td>78%</td>
</tr>
<tr>
<td>K. Total liabilities to shareholders' equity</td>
<td>338%</td>
<td>315%</td>
<td>301%</td>
<td>351%</td>
<td>332%</td>
</tr>
<tr>
<td>L. Coverage of interest charges</td>
<td>2.71</td>
<td>4.05</td>
<td>3.68</td>
<td>3.52</td>
<td>3.48</td>
</tr>
<tr>
<td><strong>Drilling &amp; Production</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M. Wells drilled</td>
<td>363</td>
<td>295</td>
<td>231</td>
<td>226</td>
<td>196</td>
</tr>
<tr>
<td>N. Wells completed</td>
<td>275</td>
<td>247</td>
<td>184</td>
<td>172</td>
<td>139</td>
</tr>
<tr>
<td>O. Natural Gas Production (thousand cubic feet per day)</td>
<td>155,000</td>
<td>136,000</td>
<td>140,000</td>
<td>126,000</td>
<td>128,000</td>
</tr>
<tr>
<td>P. Crude and condensate produced (daily average barrels)</td>
<td>6,600</td>
<td>5,700</td>
<td>6,300</td>
<td>6,800</td>
<td>5,900</td>
</tr>
<tr>
<td><strong>Other Data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q. S&amp;P Stock Price Index - Composite (500)</td>
<td>120.40</td>
<td>129.55</td>
<td>114.16</td>
<td>99.71</td>
<td>90.25</td>
</tr>
<tr>
<td>R. S&amp;P Oil Crude Producers Price Index (both indices on a base of 10, 1941-43)</td>
<td>588.4</td>
<td>768.0</td>
<td>558.5</td>
<td>273.8</td>
<td>236.5</td>
</tr>
</tbody>
</table>

*Ratios adjusted for stock splits, stock dividends, etc.
APPENDIX C
CASE II

Please determine the expected stock price of this publicly traded company using the method of valuation you usually apply. Please describe your method below by answering the questions listed for the valuation method used, be it net present value of future dividends, cash flows or earnings; relative value analysis; or net asset valuation. If your valuation method combines any one of these three methods, please complete the questions for each method used and indicate the manner of the combination in the other section (IV). If your valuation method is different from the three listed valuation methods, please describe and define it in question IV.

I. Present value methods

A. The constant growth model

The constant growth rate method gives an expected stock price of __________ per share.

Using forecasted year-end dividends per share of __________, determined as follows:

Or using forecasted earnings per share of __________, determined as follows:

Or using forecasted cash flows per share of __________, determined as follows:

And using a discount rate of _____%, comprised of a risk-free rate of _____%, and a premium of __________ over the risk-free rate. The risk-free and premium rates are determined as follows:
And using a projected constant dividend growth rate of ______% determined as follows:

B. Multi-period Growth Rate Models

1. The dividend approach of the multi-period growth rate model gives a stock price of ________ per share.

Using a current dividend flow of ________ per share, determined as follows:

For _____ years of initial growth;
And an assumed constant growth rate of dividends in the initial period of _____%, determined as follows:

And an investor's required rate of return in the initial period of _____%, determined as follows:

This gives a present value of dividends during the initial growth period of ________ per share.

Using an investor's required rate of return in the final period of _____%, determined as follows:

And an assumed constant growth rate of dividends in the final period of _____%, determined as follows:

This gives a present value at the end of the initial growth period of ________ per share.
2. The earnings approach of the multi-period growth rate method gives a stock price of ______ per share.

Using the expected level of after-tax earnings (or cash flows) of ______ from investments currently in place, determined as follows:

Using a discount rate of _____% to capitalize these earnings from current investments, determined as follows:

Using the value added by the tax deductible portion of the present value of the debt of _______, determined as follows:

Using _____% of expected after-tax cash flows from current projects retained for investment;
Using _____ years of supernormal growth;
Using an expected rate of return on new investments of _____% determined as follows:

Using the weighted average cost of capital for the firm of _____% determined as follows:

C. Other present value method if routinely used, please describe and define assumptions:
D. Information used in determining value:

_____ a. primary (historical cost-based) financial statements.

_____ b. ratios. Please indicate the ratio(s) used:

_____ c. supplementary disclosure information used:

- 1) capitalized costs
- 2) costs incurred
- 3) results of operations
- 4) proved oil and gas quantities
- 5) standardized measure of discounted future net cash flows and changes therein

II. Relative value method

Relative value analysis gives an expected stock value of ________ per share.

Using a projected company return on equity of _____% 

Using expected pretax profit of ________ and expected sales of ________ to get an expected margin of ________.

Using expected sales of ________ and expected assets of ________ to get a turnover of ________.

Using expected assets of ________ and expected equity of ________ to get leverage of ________.

Using a tax retention (1 - tax rate) of ________.

Using a profit retention (1 - payout) of ________.

Using a projected company current ratio of ________.

Using an expected company price-earnings ratio of ________.

Using an expected S & P 500 price-earnings ratio of ________.

Using an expected S & P crude oil producers index of ________.
Please describe and explain assumptions and calculations made:

Information used in determining value

   a. primary (historical cost-based) financial statements
   b. ratios. Please indicate the ratio(s) used:

   c. supplementary disclosure information used:
      1) capitalized costs
      2) costs incurred
      3) results of operations
      4) proved oil and gas quantities
      5) standardized measure of discounted future net cash flows and changes therein.

III. Asset valuation method

Asset valuation analysis gives an expected stock price of ________ per share.

Using a book value of ________ per share determined by:

Using a liquidation value of ________ per share determined as follows:

Using a cash value per share of ________ determined as follows:

Using a replacement cost of ________ per share determined by:
Using an intrinsic value of ________ per share which would accrue through sale or merger as a continuing business, determined as follows:

Other method or factors used in asset valuation, please describe and explain assumptions:

Information used in determining value:

_____ a. primary (historical cost-based) financial statements
_____ b. ratios. Please indicate the ratio(s) used:

_____ c. supplementary disclosure information used:

_____ 1) capitalized costs
_____ 2) costs incurred
_____ 3) results of operations
_____ 4) proved oil and gas quantities
_____ 5) standardized measure of discounted future net cash flows and changes therein.

IV. Other method you routinely use, gives a stock price of ________ per share,

On the basic assumptions of:
Please briefly describe your method:

Information used in determining value:

____ a. primary (historical cost-based) financial statements

____ b. ratios. Please state the ratio(s) used:

____ c. supplementary disclosure information used:

____ 1) capitalized costs

____ 2) costs incurred

____ 3) results of operations

____ 4) proved oil and gas quantities

____ 5) standardized measure of discounted future net cash flows and changes therein.
# CONSOLIDATED BALANCE SHEETS

January 31, 1982 and 1981 (in thousands)

<table>
<thead>
<tr>
<th>Assets</th>
<th>1982</th>
<th>1981</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Assets:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash</td>
<td>$46,299</td>
<td>$15,816</td>
</tr>
<tr>
<td>Temporary cash investments</td>
<td>5,986</td>
<td>23,300</td>
</tr>
<tr>
<td>Trade receivables</td>
<td>162,622</td>
<td>124,824</td>
</tr>
<tr>
<td>Inventories</td>
<td>76,196</td>
<td>26,727</td>
</tr>
<tr>
<td>Other</td>
<td>4,912</td>
<td>3,767</td>
</tr>
<tr>
<td>Total current assets</td>
<td>296,315</td>
<td>194,334</td>
</tr>
<tr>
<td>Property, Plant and Equipment, at cost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil and gas properties, full cost method</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs being amortized</td>
<td>811,031</td>
<td>543,366</td>
</tr>
<tr>
<td>Costs not being amortized</td>
<td>51,478</td>
<td>23,114</td>
</tr>
<tr>
<td>Gas processing and transmission facilities</td>
<td>299,769</td>
<td>200,685</td>
</tr>
<tr>
<td>Other</td>
<td>108,831</td>
<td>66,290</td>
</tr>
<tr>
<td></td>
<td>1,273,109</td>
<td>833,463</td>
</tr>
<tr>
<td>Less accumulated depreciation, depletion and amortization</td>
<td>274,005</td>
<td>190,005</td>
</tr>
<tr>
<td></td>
<td>997,104</td>
<td>643,458</td>
</tr>
<tr>
<td>Realty Assets, at cost, substantially all pledged</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Project</td>
<td>263,594</td>
<td>216,477</td>
</tr>
<tr>
<td>Real estate held for investment, development and sale</td>
<td>97,648</td>
<td>95,752</td>
</tr>
<tr>
<td>Notes and contracts receivable</td>
<td>38,873</td>
<td>29,557</td>
</tr>
<tr>
<td></td>
<td>400,113</td>
<td>342,785</td>
</tr>
<tr>
<td>Investments and Other Assets</td>
<td>6,894</td>
<td>10,466</td>
</tr>
<tr>
<td></td>
<td>$1,699,833</td>
<td>$1,780,144</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Liabilities and Stockholders Equity</th>
<th>1982</th>
<th>1981</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Liabilities:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current maturities of long-term debt</td>
<td>$22,727</td>
<td>$17,315</td>
</tr>
<tr>
<td>Oil and gas proceeds payable</td>
<td>92,147</td>
<td>73,169</td>
</tr>
<tr>
<td>Accrued liabilities</td>
<td>84,466</td>
<td>45,314</td>
</tr>
<tr>
<td>Total current liabilities</td>
<td>247,853</td>
<td>181,256</td>
</tr>
<tr>
<td>Long term debt:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unsecured revaluing line of credit with ten banks, convertible to four-year term note</td>
<td>$243,000</td>
<td></td>
</tr>
<tr>
<td>Other unsecured lines of credit with banks, convertible to three-year term notes</td>
<td>190,000</td>
<td></td>
</tr>
<tr>
<td>Insurance company notes secured by P&amp;P of $6,500,000 payable semiannually to 1990</td>
<td>115,000</td>
<td></td>
</tr>
<tr>
<td>Notes and capitalized equipment lease obligations to banks and others</td>
<td>30,204</td>
<td></td>
</tr>
<tr>
<td>Less current maturities</td>
<td>22,727</td>
<td>190,420</td>
</tr>
<tr>
<td>Realty Liabilities</td>
<td>222,746</td>
<td>190,420</td>
</tr>
<tr>
<td>Other Liabilities and Deferred Credits:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deferred Federal income taxes</td>
<td>265,372</td>
<td>183,456</td>
</tr>
<tr>
<td>Revenues subject to refund</td>
<td>12,661</td>
<td>10,493</td>
</tr>
<tr>
<td>Other</td>
<td>6,946</td>
<td>9,330</td>
</tr>
<tr>
<td>Stockholders' Equity</td>
<td>284,079</td>
<td>203,275</td>
</tr>
<tr>
<td>Common stock, $.10 par value, 100 million shares, 48 million issued in '82 and 36 million shares issued in '81</td>
<td>4,822</td>
<td>3,623</td>
</tr>
<tr>
<td>Additional paid in capital</td>
<td>20,025</td>
<td>21,177</td>
</tr>
<tr>
<td>Retained earnings</td>
<td>375,131</td>
<td>271,410</td>
</tr>
<tr>
<td>Less treasury stock at cost</td>
<td>(11,804)</td>
<td>(11,802)</td>
</tr>
<tr>
<td></td>
<td>388,174</td>
<td>284,348</td>
</tr>
<tr>
<td></td>
<td>$1,699,833</td>
<td>$1,780,144</td>
</tr>
</tbody>
</table>

1982
CONSOLIDATED STATEMENTS OF EARNINGS

For the years ended January 1982 and 1981 (in thousands)

<table>
<thead>
<tr>
<th></th>
<th>1982</th>
<th>1981</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Exploration and</td>
<td>366,534</td>
<td>245,716</td>
</tr>
<tr>
<td>production</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Transmission and</td>
<td>628,285</td>
<td>402,830</td>
</tr>
<tr>
<td>processing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Realty operations</td>
<td>70,025</td>
<td>47,498</td>
</tr>
<tr>
<td></td>
<td>1,064,844</td>
<td>696,044</td>
</tr>
<tr>
<td>Costs and Expenses:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Exploration and</td>
<td>166,947</td>
<td>111,959</td>
</tr>
<tr>
<td>production</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Transmission and</td>
<td>474,774</td>
<td>272,088</td>
</tr>
<tr>
<td>processing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Realty operations</td>
<td>46,522</td>
<td>35,477</td>
</tr>
<tr>
<td>Depreciation,</td>
<td>95,832</td>
<td>55,357</td>
</tr>
<tr>
<td>depletion, and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>amortization</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>784,075</td>
<td>474,881</td>
</tr>
<tr>
<td>Operating Earnings</td>
<td>280,769</td>
<td>221,163</td>
</tr>
<tr>
<td>Other (Income)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expense:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General and</td>
<td>41,809</td>
<td>29,605</td>
</tr>
<tr>
<td>administrative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expense</td>
<td>107,749</td>
<td>54,062</td>
</tr>
<tr>
<td>Capitalized</td>
<td>(41,479)</td>
<td>(23,570)</td>
</tr>
<tr>
<td>Income</td>
<td>(8,225)</td>
<td>(4,960)</td>
</tr>
<tr>
<td>Other</td>
<td>3,747</td>
<td>1,278</td>
</tr>
<tr>
<td>Earnings Before</td>
<td>96,107</td>
<td>56,415</td>
</tr>
<tr>
<td>Federal Income</td>
<td>184,662</td>
<td>164,748</td>
</tr>
<tr>
<td>Taxes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>(12,471)</td>
<td>2,532</td>
</tr>
<tr>
<td>Deferred</td>
<td>81,916</td>
<td>61,681</td>
</tr>
<tr>
<td></td>
<td>69,445</td>
<td>64,213</td>
</tr>
<tr>
<td>Net earnings</td>
<td>$ 115,217</td>
<td>$ 100,535</td>
</tr>
</tbody>
</table>
CONSOLIDATED STATEMENTS OF CHANGES IN FINANCIAL POSITION

For the Years Ended January 31, 1982 and 1981 (in thousands)

<table>
<thead>
<tr>
<th>Source of Funds:</th>
<th>1982</th>
<th>1981</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net earnings</td>
<td>115,217</td>
<td>100,535</td>
</tr>
<tr>
<td>Depreciation, depletion and amortization</td>
<td>95,832</td>
<td>55,357</td>
</tr>
<tr>
<td>Deferred Federal income taxes</td>
<td>81,916</td>
<td>61,681</td>
</tr>
<tr>
<td>Cost of realty assets sold</td>
<td>16,627</td>
<td>12,325</td>
</tr>
<tr>
<td>Other</td>
<td>(10,484)</td>
<td>(719)</td>
</tr>
<tr>
<td>Total from operations</td>
<td>299,108</td>
<td>229,179</td>
</tr>
<tr>
<td>Long term liability additions -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long term debt</td>
<td>264,739</td>
<td>105,938</td>
</tr>
<tr>
<td>Realty notes payable</td>
<td>49,698</td>
<td>91,057</td>
</tr>
<tr>
<td>Issuance of treasury stock</td>
<td>5,000</td>
<td>5,327</td>
</tr>
<tr>
<td>Other</td>
<td>5,135</td>
<td>6,274</td>
</tr>
<tr>
<td>Total source of funds</td>
<td>623,681</td>
<td>437,775</td>
</tr>
</tbody>
</table>

| Application of Funds: |      |      |
| Capital additions     |      |      |
| Property, plant and equipment | 449,149 | 301,542 |
| Realty assets         | 82,084 | 74,729 |
| Long-term liability payments |      |      |
| Long-term debt        | 23,648 | 11,759 |
| Realty notes payable | 15,092 | 21,869 |
| Purchase of treasury stock | 5,002 | 10,826 |
| Cash dividends        | 11,496 | 6,291 |
| Other                 | 2,228 | 7,618 |
| Total application of funds | 588,699 | 434,634 |

Increase (Decrease) in Working Capital

<table>
<thead>
<tr>
<th>Increase (Decrease) in Components of Working Capital</th>
<th>1982</th>
<th>1981</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash and temporary cash investments</td>
<td>13,169</td>
<td>11,364</td>
</tr>
<tr>
<td>Trade receivables</td>
<td>37,798</td>
<td>46,255</td>
</tr>
<tr>
<td>Inventories and other current assets</td>
<td>50,614</td>
<td>12,799</td>
</tr>
<tr>
<td>Current maturities of long-term debt</td>
<td>(5,412)</td>
<td>(545)</td>
</tr>
<tr>
<td>Oil and gas proceeds payable</td>
<td>(18,978)</td>
<td>(23,194)</td>
</tr>
<tr>
<td>Accounts payable and accrued liabilities</td>
<td>(42,209)</td>
<td>(43,538)</td>
</tr>
<tr>
<td>Increase (Decrease) in Working Capital</td>
<td>34,982</td>
<td>3,141</td>
</tr>
<tr>
<td>Working Capital, beginning of year</td>
<td>13,178</td>
<td>10,037</td>
</tr>
<tr>
<td>Working Capital, end of year</td>
<td>48,160</td>
<td>13,178</td>
</tr>
</tbody>
</table>

The preceding statements have received an unqualified auditor's opinion.
## HISTORICAL COST RATIOS

For the years ended January 31

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Earnings per share</td>
<td>$2.41</td>
<td>$2.09</td>
<td>$1.27</td>
<td>$0.68</td>
<td>$0.67</td>
</tr>
<tr>
<td>B. Dividends per Share</td>
<td>.24</td>
<td>.13</td>
<td>.06</td>
<td>.03</td>
<td>.02</td>
</tr>
<tr>
<td>C. Return on total assets</td>
<td>5.8%</td>
<td>8.0%</td>
<td>10.3%</td>
<td>8.6%</td>
<td>5.9%</td>
</tr>
<tr>
<td>D. Return on shareholders' equity</td>
<td>29.7%</td>
<td>34.2%</td>
<td>42.0%</td>
<td>34.3%</td>
<td>22.8%</td>
</tr>
<tr>
<td>E. Year-end stock price</td>
<td>19-3/8</td>
<td>49-1/2</td>
<td>40-1/8</td>
<td>17-7/8</td>
<td>29-1/8</td>
</tr>
<tr>
<td>F. P/E ratio</td>
<td>8</td>
<td>23</td>
<td>31</td>
<td>26</td>
<td>43</td>
</tr>
<tr>
<td>G. Dividend yield</td>
<td>1.2%</td>
<td>0.26%</td>
<td>0.15%</td>
<td>0.17%</td>
<td>0.07%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>H. Current ratio</td>
<td>1.19</td>
<td>1.07</td>
<td>1.10</td>
<td>1.17</td>
<td>1.20</td>
</tr>
<tr>
<td>I. Quick ratio</td>
<td>0.89</td>
<td>0.93</td>
<td>0.99</td>
<td>1.00</td>
<td>0.98</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>J. Total liabilities to total assets</td>
<td>77%</td>
<td>76%</td>
<td>75%</td>
<td>79%</td>
<td>78%</td>
</tr>
<tr>
<td>K. Total liabilities to shareholders' equity</td>
<td>338%</td>
<td>315%</td>
<td>301%</td>
<td>351%</td>
<td>332%</td>
</tr>
<tr>
<td>L. Coverage of interest charges</td>
<td>2.71</td>
<td>4.05</td>
<td>3.68</td>
<td>3.52</td>
<td>3.48</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drilling &amp; Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. Wells drilled</td>
</tr>
<tr>
<td>N. Wells completed</td>
</tr>
<tr>
<td>O. Natural Gas Production (thousand cubic feet per day)</td>
</tr>
<tr>
<td>P. Crude and condensate produced (daily average barrels)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q. S&amp;P Stock Price Index - Composite (500)</td>
</tr>
<tr>
<td>R. S&amp;P Oil Crude Producers Price Index (both indices on a base of 10, 1941-43)</td>
</tr>
</tbody>
</table>

*Ratios adjusted for stock splits, stock dividends, etc.*
**CAPITALIZED COSTS RELATING TO OIL AND GAS PRODUCING ACTIVITIES**

at January 31, 1982 and January 31, 1981 (in thousands)

<table>
<thead>
<tr>
<th></th>
<th>1982</th>
<th>1981</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td>Unproved Oil and Gas Properties</td>
<td>858,199</td>
<td>559,646</td>
</tr>
<tr>
<td>Proved oil and gas properties</td>
<td>4,310</td>
<td>6,836</td>
</tr>
<tr>
<td>Accumulated depreciation, depletion, and amortization, and valuation allowances</td>
<td>219,221</td>
<td>150,079</td>
</tr>
<tr>
<td>Net capitalized costs</td>
<td>643,288</td>
<td>416,401</td>
</tr>
</tbody>
</table>

**COSTS INCURRED IN OIL AND GAS PRODUCING ACTIVITIES**

for year ended January 31, 1982 and January 31, 1981 (in thousands)

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>United States</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1982</td>
<td>1981</td>
<td></td>
</tr>
<tr>
<td>Property acquisition costs</td>
<td>49,802</td>
<td>49,802</td>
<td>-</td>
</tr>
<tr>
<td>Exploration costs</td>
<td>96,784</td>
<td>95,844</td>
<td>940</td>
</tr>
<tr>
<td>Development costs</td>
<td>157,632</td>
<td>149,751</td>
<td>7,881</td>
</tr>
<tr>
<td>Production costs</td>
<td>93,879</td>
<td>89,185</td>
<td>4,694</td>
</tr>
<tr>
<td></td>
<td>1981</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Property acquisition costs</td>
<td>25,242</td>
<td>25,242</td>
<td>-</td>
</tr>
<tr>
<td>Exploration costs</td>
<td>63,492</td>
<td>62,835</td>
<td>657</td>
</tr>
<tr>
<td>Development costs</td>
<td>109,104</td>
<td>103,649</td>
<td>5,455</td>
</tr>
<tr>
<td>Production costs</td>
<td>65,373</td>
<td>52,104</td>
<td>3,269</td>
</tr>
</tbody>
</table>
RESULTS OF OPERATIONS FOR PRODUCING ACTIVITIES FOR THE YEARS
ended January 31, 1982 and January 31, 1981 (in thousands)
(An historical cost-based statement)

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>United States</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1982</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenues</td>
<td>250,972</td>
<td>238,423</td>
<td>12,549</td>
</tr>
<tr>
<td>Production costs</td>
<td>93,879</td>
<td>89,185</td>
<td>4,694</td>
</tr>
<tr>
<td>Exploration expenses*</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Depreciation, depletion, and amortization, and value provisions</td>
<td>75,159</td>
<td>71,401</td>
<td>3,758</td>
</tr>
<tr>
<td>Income tax expense</td>
<td>81,934</td>
<td>77,837</td>
<td>4,097</td>
</tr>
<tr>
<td>Results of operations for producing activities (excluding corporate overhead and financing costs)</td>
<td>30,807</td>
<td>29,266</td>
<td>1,541</td>
</tr>
<tr>
<td></td>
<td>51,127</td>
<td>48,571</td>
<td>2,556</td>
</tr>
</tbody>
</table>

|                  |        |                |        |
| **1981**         |        |                |        |
| Revenues         | 174,181| 165,471        | 8,710  |
| Production costs | 65,373 | 62,104         | 3,269  |
| Exploration costs | 0     | 0              | 0      |
| Depreciation, depletion, and amortization, and value provisions | 46,233 | 43,921         | 2,312  |
| Income tax expense | 62,575 | 59,446        | 3,129  |
| Results of operations for producing activities (excluding corporate overhead and financing costs) | 24,404 | 23,184         | 1,220  |
|                  | 38,171 | 36,262         | 1,909  |

* Full cost company capitalizes all exploration costs when incurred and subsequently reflects these costs in D,D&A, and value provisions.
RESERVE QUANTITY INFORMATION
For the Year Ended January 31, 1982 and 1981

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>United States</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oil*</td>
<td>Gas*</td>
<td>Oil*</td>
</tr>
<tr>
<td>1982</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proved Developed and Undeveloped Reserves:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beginning balance</td>
<td>92,453</td>
<td>507,216</td>
<td>92,453</td>
</tr>
<tr>
<td>Revisions of previous estimates</td>
<td>902 (16,864)</td>
<td>902 (16,778)</td>
<td></td>
</tr>
<tr>
<td>Improved recovery</td>
<td>158</td>
<td>47</td>
<td>158</td>
</tr>
<tr>
<td>Purchase of minerals in place</td>
<td>73</td>
<td>2,297</td>
<td>73</td>
</tr>
<tr>
<td>Extension, discoveries, and other additions</td>
<td>32,313</td>
<td>104,527</td>
<td>32,313</td>
</tr>
<tr>
<td>Production</td>
<td>(16,252)</td>
<td>(58,323)</td>
<td>(16,252)</td>
</tr>
<tr>
<td>Sales of minerals in place</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>End of year</td>
<td>109,647</td>
<td>538,900</td>
<td>109,647</td>
</tr>
<tr>
<td>Proved Developed Reserves:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beginning of year</td>
<td>77,867</td>
<td>383,787</td>
<td>77,867</td>
</tr>
<tr>
<td>End of year</td>
<td>97,070</td>
<td>432,156</td>
<td>97,070</td>
</tr>
</tbody>
</table>

1981

| Proved Developed and Undeveloped Reserves: |             |               |              |               |              |               |
| Beginning balance   | 80,292      | 454,026       | 80,292       | 424,743       | 29,283       |
| Revisions of previous estimates | 1,521 (14,290) | 1,521 (12,742) |              | (1,548)      |              |
| Improved recovery   | 415         | 38            | 415          | 38            |              |               |
| Purchase of minerals in place | 288          | 1,658         | 288          | 1,658         |              |               |
| Extensions, discoveries, and other additions | 24,004      | 116,663       | 24,004       | 111,465       | 5,198        |
| Production          | (14,067)    | (50,879)      | (14,067)     | (46,722)      | (4,157)      |
| Sales of minerals in place | -          | -             | -            | -             | -            |
| End of year         | 92,453      | 507,216       | 92,453       | 478,440       | 28,776       |

Proved Developed Reserves:

| Beginning of year   | 68,674      | 358,864       | 68,674       | 338,310       | 20,554       |
| End of year         | 77,867      | 383,787       | 77,867       | 363,739       | 20,048       |

* Oil stated in 1000 barrels and gas stated in mmcf.
STANDARDIZED MEASURE OF DISCOUNTED FUTURE NET CASH FLOWS AND
CHANGES THEREIN RELATING TO PROVED OIL AND GAS RESERVES
at January 31, 1982 and January 31, 1981 (in thousands)
(based on year-end costs and year-end prices)

<table>
<thead>
<tr>
<th></th>
<th>1982</th>
<th></th>
<th>1981</th>
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<tr>
<td></td>
<td>Total</td>
<td>United States</td>
<td>Canada</td>
<td>Total</td>
</tr>
<tr>
<td>Future cash inflows*</td>
<td>8,443,291</td>
<td>8,021,126</td>
<td>422,165</td>
<td>6,935,722</td>
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<tr>
<td>Future income tax expense*</td>
<td>(1,391,243)</td>
<td>(1,321,680)</td>
<td>(69,563)</td>
<td>(966,732)</td>
</tr>
<tr>
<td>Future net cash flows</td>
<td>2,529,687</td>
<td>2,403,204</td>
<td>126,483</td>
<td>2,134,343</td>
</tr>
<tr>
<td>10% annual discount for estimated timing of cash flows</td>
<td>(1,121,317)</td>
<td>(1,065,251)</td>
<td>(56,066)</td>
<td>(850,164)</td>
</tr>
<tr>
<td>Standardized measure of discounted future net cash flows relating to proved oil and gas reserves</td>
<td>1,408,370</td>
<td>1,337,953</td>
<td>70,417</td>
<td>1,284,179</td>
</tr>
</tbody>
</table>

Beginning of year
Changes resulting from:
Sales and transfers of oil and gas produced, net of production costs | (276,311) | (262,495) | (13,816) | (221,083) | (210,029) | (11,054) |
Net changes in prices, and development and production costs | 193,432 | 183,760 | 9,672 | 260,196 | 247,186 | 13,010 |
Extensions, discoveries, additions, and improved recovery less related costs | 143,018 | 135,866 | 7,152 | 148,777 | 141,338 | 7,439 |
Development costs incurred during the period | 39,728 | 37,742 | 1,986 | 31,499 | 29,915 | 1,574 |
Revisions of previous quantity estimates | (108,172) | (102,763) | (5,409) | (83,954) | (79,756) | (4,198) |
Net change in purchases and sales of minerals in place | 4,310 | 4,095 | 215 | 6,836 | 6,494 | 342 |
Accretion of discount | 73,571 | 69,892 | 3,679 | 52,446 | 49,824 | 2,622 |
Net change in income taxes | 30,807 | 29,267 | 1,540 | 29,266 | 27,803 | 1,463 |
Other | 23,808 | 22,618 | 1,190 | 26,748 | 25,411 | 1,337 |
End of year | 1,408,370 | 1,337,953 | 70,417 | 1,284,179 | 1,219,971 | 64,208 |

* Future net cash flows were computed using year-end prices and costs, and year-end statutory tax rates that relate to existing proved oil and gas reserves in which the company has mineral interests.
APPENDIX D
January 12, 1983

In 1982 the Financial Accounting Standards Board released a proposed standard for disclosures about oil and gas producing activities, which would require publicly owned corporations to include in their annual reports certain supplementary information. These requirements would be an amendment to FASB Statements 19 and 25, and are intended to benefit users of accounting information, such as financial analysts.

I am conducting research for my doctoral dissertation in finance at North Texas State University to determine whether the newly proposed supplementary disclosures will be used by financial analysts in valuing the stock price of an oil or gas producing company, whether these disclosures will be used to a greater extent in a particular valuation method, and whether one type of disclosure will be preferred to any other. The FASB will be advised of the results of this survey.

You have been chosen to represent members of the Financial Analyst Federation in this area. A research interviewer will call to make an appointment with you for about an hour of your time to value two companies, one with only basic financial statements and historical cost ratios; and the other with basic financial statements, historical cost ratios and the newly proposed supplementary disclosure information. As a member of this relatively small sample, your participation is very important and will increase the validity of conclusions drawn from the study.

This project is being conducted under the supervision of Dr. Mike Walker, Head of the Department of Finance, and Dr. Horace Brock, Head of the Extractive Industries Accounting Research Institute. Your responses will be kept in absolute confidence, and the findings will be available to participants upon completion of the project.

Your help in this study will be greatly appreciated. It is expected that the findings of this project will be beneficial both to the FASB in evaluating the effectiveness of these disclosures, and to the community of financial analysts in evaluating the usefulness of these disclosures in determining value.

Sincerely,

Steve Avard
Research Associate

SA/z
Mr. Steve Avard is a doctoral candidate in finance at North Texas State University. For his dissertation he is conducting research on the usefulness of extended disclosure requirements in the valuation of publicly traded oil and gas producing companies. He also is attempting to determine the valuation methods actually used for the stock of such companies by practicing financial analysts in the Texas-Oklahoma portion of the southwest. Mr. Avard's efforts have been partially funded by a grant from the Gulf Oil Corporation.

Your participation in this research effort will be deeply appreciated by Mr. Avard and myself. It would also be of great value in helping the academic community and the Financial Accounting Standards Board better understand what data is used by financial analysts in the area of oil and gas producing companies along with how the data is used.

I urge you to spend the time to analyze the two cases and complete the questionnaire with Mr. Avard.

Thank you for your cooperation.

Sincerely,

Michael C. Walker
Professor of Finance and
Head, FIREL Department

gw
APPENDIX E
TABLE VIII

PARAMETRIC TESTING FOR CHANGES IN VALUE

<table>
<thead>
<tr>
<th></th>
<th>All Methods</th>
<th>Present Value Method</th>
<th>Relative Value Method</th>
<th>Asset Value Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Case I</td>
<td>Case II</td>
<td>Case I</td>
<td>Case II</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>42</td>
<td>42</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Median</td>
<td>15.700</td>
<td>19.750</td>
<td>22.000</td>
<td>22.465</td>
</tr>
<tr>
<td>Skewness Coefficient(^1)</td>
<td>-0.300</td>
<td>-0.525</td>
<td>-2.009</td>
<td>0.000</td>
</tr>
<tr>
<td>Kurtosis Coefficient(^2)</td>
<td>-1.377</td>
<td>1.041</td>
<td>4.293</td>
<td>0.000</td>
</tr>
</tbody>
</table>

\(^1\)Pearson's coefficient of skewness: normal distribution has a value of zero.

\(^2\)Normal distribution has a kurtosis coefficient of about 0.250.
TABLE IX

FREQUENCY DISTRIBUTIONS OF VALUE ESTIMATES FOR RESPONSES USING ALL METHODS OF VALUATION

<table>
<thead>
<tr>
<th>Number of Responses</th>
<th>Estimated Value Case I</th>
<th>Number of Responses</th>
<th>Estimated Value Case II</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>NEI¹</td>
<td>1</td>
<td>6.00</td>
</tr>
<tr>
<td>1</td>
<td>11.13</td>
<td>1</td>
<td>9.75</td>
</tr>
<tr>
<td>1</td>
<td>12.72</td>
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<tr>
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<td>14.40</td>
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<tr>
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<td>14.14</td>
<td>1</td>
<td>14.46</td>
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<td>1</td>
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<td>1</td>
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<tr>
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<td>17.75</td>
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<td>4</td>
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<td>19.28</td>
<td>1</td>
<td>18.11</td>
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<td>19.37</td>
<td>1</td>
<td>19.00</td>
</tr>
<tr>
<td>2</td>
<td>20.00</td>
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<td>21.80</td>
<td>1</td>
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</tr>
<tr>
<td>2</td>
<td>24.92</td>
<td>1</td>
<td>20.80</td>
</tr>
<tr>
<td>2</td>
<td>24.93</td>
<td>1</td>
<td>21.00</td>
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<td>25.75</td>
<td>1</td>
<td>21.50</td>
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<td>30.00</td>
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</tbody>
</table>

¹NEI = Not enough information given to make a reasonable estimate of value.
TABLE X
FREQUENCY DISTRIBUTIONS OF VALUE ESTIMATES FOR RESPONSES USING THE PRESENT VALUE METHOD OF VALUATION

<table>
<thead>
<tr>
<th>Number of Responses</th>
<th>Estimated Value Case I</th>
<th>Number of Responses</th>
<th>Estimated Value Case II</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NEI (^1)</td>
<td>1</td>
<td>20.00</td>
</tr>
<tr>
<td>1</td>
<td>15.00</td>
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<td>24.93</td>
</tr>
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</tr>
<tr>
<td>1</td>
<td>21.80</td>
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</tr>
<tr>
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<td>24.93</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\)NEI = Not enough information given to make a reasonable estimate of value.
### TABLE XI

**FREQUENCY DISTRIBUTIONS OF VALUE ESTIMATES FOR RESPONSES USING THE RELATIVE VALUE METHOD OF VALUATION**

<table>
<thead>
<tr>
<th>Number of Responses</th>
<th>Estimated Value Case I</th>
<th>Number of Responses</th>
<th>Estimated Value Case II</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NEI(^1)</td>
<td>1</td>
<td>14.40</td>
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<td>12.72</td>
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<td>1</td>
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</tbody>
</table>

\(^1\)NEI = Not enough information given to make a reasonable estimate of value.
TABLE XII

FREQUENCY DISTRIBUTIONS OF VALUE ESTIMATES FOR RESPONSES USING THE ASSET VALUE METHOD OF VALUATION

<table>
<thead>
<tr>
<th>Number of Responses</th>
<th>Estimated Value Case I</th>
<th>Estimated Value Case II</th>
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<tbody>
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<tr>
<td>1</td>
<td>26.41</td>
<td></td>
</tr>
</tbody>
</table>

<sup>1</sup>NEI = Not enough information given to make a reasonable estimate of value.
APPENDIX G
EXHIBIT I

EXAMPLES OF THE CONSTANT PERIOD NET PRESENT VALUE METHODS OF STOCK VALUATION

Example 1:

Cash flow from operation \( \frac{299,000,000}{48,000,000} \times 3.5^* = \$21.80 \) per share

*The multiples ranged from 2.0 to 4.0. These multiples are based on estimates of risk and opportunity, and are revised periodically to adjust for changing market conditions. They are not P/E ratios.

Example 2:

Earnings per share of $2.00
\[ \text{R}_F \text{ of } 3\% + 6\% \text{ premium } \frac{2.00}{.09} = \$22.00 \) per share*

*The discount rate ranged from 9% to 12%. The estimate of future earnings ranged from $2.00 to $4.00.
EXHIBIT II
EXAMPLES OF THE RELATIVE VALUE METHODS
OF STOCK VALUATION

Fundamental Analysis

Expected earnings of $2.41^a x P/E of 8^b = $19.28 per share

^aExpected earnings estimates ranged from a low of $1.59 to a high of $2.50.

^bPrice-earnings multiples ranged from 6 to 12.

One variation was as follows:

$160,000,000 expected pre-tax earnings x .74 tax retention x 6.5 P/E = $770,000,000

$770,000,000

48,000,000 shares = $16.04 per share

Technical Analysis

5 years EPS growth of 29% justifies a premium P/E of 10 to 12.

(10 to 12 P/E) x expected earnings of $2.40 = $24 to $30 per share. Mid-point value = $27.00.

Technical price strength for 1982 is -155% for the company and -7% for the S&P 500.

Technical price strength for the past 5 years is -7.8% for the company and +6% for the S&P 500. This indicates a market lack of conviction in earnings growth for the next 5 years. Investment would not occur until the technical strength improves.
EXHIBIT III
EXAMPLES OF THE ASSET VALUE METHODS
OF STOCK VALUATION

A sample method of asset valuation:

Oil reserves of 109.647 million barrels
  x $11.50/bbl $1260.9 million
U.S. gas reserves of 31,133 mmcf
  x $1.65/mcf 837.8
Canadian gas reserves of 153.5
  x $0.75/mcf 23.3
Transmission and processing:
  Revenues - Expenses + DDA =
    $173.5 x .4 694.0
Real estate cost of $97.6 + $263.6 361.2
Current assets 296.0
Current liabilities (247.9)
Long-term liabilities (223.7)

$3001.6 million

$3001.6 million + 48 million shares = $62.50 per share

$62.50 x .4 = $25.00 per share

Variations for determining oil and gas production asset values are as follows:

A. Accepting the standardized measure of discounted future net cash flows relating to proved oil and gas reserves of $1,408,370,000

B. Determining earnings from oil and gas production times a multiple of 8, plus 70% of the standardized measure which gives a value of $1,488,000,000

C. Using various prices for valuing quantities of reserves. Oil reserve prices ranged from $8.00 to $11.50 per barrel. U.S. gas prices ranged from $0.50 to $1.65. Canadian gas prices ranged from $0.50 to $0.75.

D. Some analysts used the standardized measure but reduced it to values ranging from 50% to 80% of its stated value.
A sample method using weighting factors determined from experience:

Book value of $388 million + 48 million shares x 0.1 = $ .81

Liquidation value of

\[
\frac{(97,070 \text{ barrels} \times \$8.70/\text{bbl}) + (432,156 \text{ mcf} \times \$0.50/\text{mcf})}{48 \text{ million shares}} \times 0.5 = 11.05
\]

Intrinsic value of

\[
\frac{$2,529,687,000 \text{ discounted at 15\% for 6.14 yrs}}{48 \text{ million shares}} \times .04 = 8.94
\]

$20.80 per share

A sample of asset valuation using a short method:

\[
\frac{$1,408,000,000}{48,000,000} \times .75 = $22.00
\]
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<tr>
<th></th>
<th>Case I</th>
<th>Case II</th>
</tr>
</thead>
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<td>40</td>
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<tr>
<td>Return on equity</td>
<td>5</td>
<td>6</td>
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<tr>
<td>Year end stock price</td>
<td>7</td>
<td>6</td>
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<tr>
<td>Price-earnings ratio</td>
<td>10</td>
<td>9</td>
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<tr>
<td>Dividend yield</td>
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<tr>
<td>Current ratio</td>
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<td>3</td>
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<tr>
<td>Quick ratio</td>
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<tr>
<td>Total assets to total liabilities</td>
<td>6</td>
<td>7</td>
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<tr>
<td>Total liabilities to stockholder's equity</td>
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<tr>
<td>Interest coverage</td>
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<tr>
<td>Wells drilled</td>
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<tr>
<td>Wells completed</td>
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<tr>
<td>Natural gas production per day</td>
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<tr>
<td>Crude and condensate production per day</td>
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<tr>
<td>S&amp;P 500 index</td>
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<tr>
<td>S&amp;P oil producers price index</td>
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