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Organization Structure and Financial Market Performance: A Preliminary Test

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ORGANIZATION STRUCTURE AND FINANCIAL MARKET PERFORMANCE: A PRELIMINARY TEST

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ABSTRACT

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This paper builds on the M-form hypothesis of Williamson (1975) and empirical tests of it at the level of accounting data by Armour and Teece (1978), Teece (1981), and Steer and Cable (1978). An exploratory hypothesis that systematic risk will decline with the adoption of the M-form structure is developed. Empirical investigation suggests that this hypothesis is correct. Implications of this result are discussed.

ORGANIZATIONAL STRUCTURE AND FINANCIAL MARKET PERFORMANCE: A PRELIMINARY TEST

1. Introduction

This paper presents a modest test of the importance of internal organizational structure in determining the firm's performance as reflected in the market value of the firm's equity. More specifically the paper aims to determine if the M-form hypothesis of Williamson (1975, Chapter 8) which posits superior performance for organizations adopting a particular kind of multidivisional structure can be extended from accounting book measures to financial market measures of performance. Tests by Armour and Teece (1978), Teece (1981) and Steer and Cable have tended to confirm this hypothesis at the level of accounting data. The current paper extends earlier work of Armour and Teece (1978) in which a sample of petroleum industry firms was used to conclude in support of the M-form hypothesis using accounting rates of return on equity. The same sample is used with data on returns and risks obtained from capital market substituted for the accounting returns utilized by Armour and Teece.

2. The M-Form Hypothesis and the Armour and Teece Test

Building on the work of Chandler (1962), who documented the rise of the multidivisional-internal-organizational structure as the response of large American corporations to the complexities of increased size, Williamson (1970, 1975, 1981) developed an economic theory of organizational structure. Williamson observed that growing functionally organized firms inevitably encountered two problems with the increase in size and diversity: (1) the cumulative control loss, and (2) the confounding of strategic and operating decision-makings. This logically led Williamson (1970, 1975) to conclude that

a breakdown in the effective profit-maximizing behavior would occur in functionally organized firms. In his view, the multidivisional (or M-form) organization was a logical response to this efficiency decline.

According to Williamson an M-form organization can induce an apropriate goal-pursuit by divisions organized along the product, brand, or geographic lines. Thus, a divisional manager is given an explicit objective function, usually a return or rate of return measure and then induced through various incentives (e.g., bonuses) to maximize the objective function. Furthermore, Williamson asserts that the M-form organization separates strategic and operating decision-makings. He calls this separation the hierarchical decomposition principle of organization design (Williamson, 1981, p. 1550):

> Internal organization should be designed in such a way as to effect quasi-independence between the parts, the high frequency dynamics (operating activities) and low frequency dynamics should be clearly distinguished and incentives should be aligned within and between components so as to promote both local and global effectiveness.

Finally, Williamson suggests that M-form organizations possess superior internal information and control techniques to those possessed by the external capital markets. In this regard he is following the lead of Heflebower (1960) and Alchian (1969) though he is more positive in judging the efficiency of organization over the external markets. A direct result of Williamson's assertions is the M-form hypothesis (1975, p. 150):

> The organization and operation of the large enterprise along the lines of the M-form favors goal pursuit and least-cost behavior more nearly associated with the neoclassical profit maximization hypothesis than does the U-form (functional) organizational alternative.

Armour and Teece (1978) tested the M-form hypothesis using a sample of 28 petroleum firms during the period 1955-1973. The performance measure they used was the accounting rate of return (after taxes) on stockholders equity. They argued that it was appropriate to use a book value profit rate as a measure of performance:

> There is still the question of whether the above performance measure should reflect market or book values. The desirability of using a book value measure can be illustrated as follows. Consider a firm which has identified and pursued a market opportunity yielding a return disproportionate with the risk involved (e.g., a product or process innovation, or a superior internal control system). Assume that this above normal return is effectively isolated from competitive pressure for an extended period of time (e.g., due to patent protection or to a significant lead time for competitive entry into the relevant market). The return on the equity invested in the endeavor, as measured by appropriate book values, will continue to reflect the disproportionate return realized by the firm until competitive entry has effectively eliminated it, or until the firm is sold and its assets are revalued, with the above normal returns being fully capitalized into the selling price. The capitalization of these returns into the value of the firm's securities will occur, however, at a much more rapid pace, since as soon as investors learn of the disproportionate return associated with the underlying assets, the price of the securities will be bid up to the point where the associated capital market return just compensates for the inherent risk. Furthermore, it is extremely difficult to identify exactly when such capitalization will occur. Consequently, it seems that in an analysis of the efficiency characteristics of the firm, the use of a book value profit rate measure is appropriate. (pp. 109-110)

However, it should be pointed out that the market-value-based performance measure is more consistent with the objective of managers' acting in the shareholders' best interest. Accounting rates of return are determined mainly by accountants' applications of accounting rules and methods, and often influenced by changes in these rules and methods; while the market rates of return are what the shareholders actually receive from their investment. Thus, one can argue that the performance measures based upon the market value are superior to that based upon the book value. Furthermore, in a separate paper Teece (1978) (although choosing not to do so) argued for a market value test of the M-form hypothesis:

> In competitive capital markets the level of enterprise efficiency will be reflected in the market value of the firm. Accordingly, there would appear to be merit in testing the M-form hypothesis by examining changes in the market value of the enterprise. (p. 176)

Armour and Teece specified for each firm the history of organization structure over time based on responses to a questionnaire. Basically for each

firm this resulted in three period: (1) an initial period in which the firm was organized along lines other than the M-form structure (this was usually a functional structure); (2) a transitional period during which the firm's structure was in a state of flux as it moved from one internal organizational form to another; and (3) a final period during which the firm was organized along M-form lines.

The classification of firm structure according to these periods then become one independent variable in a regression model that also included measures of size, risk, capacity utilization in the petroleum industry, and growth. (The dependent variable was return on equity as discussed above.) Cross-sectional and time-series data were pooled in estimating model parameters.

Regressions were run for two sample periods: 1955-1968 and 1969-1973. This was done because it was argued that the earlier time period represented the period during which the M-form structure was being diffused and hence differential performance could be observed. By contrast, it was argued that during the latter period, the M-form structure was almost fully diffused and so differential performance would be difficult to discern. (This does not mean that individual firm adopting the M-form structure in the latter period did not recognize increased returns.)

In their results Armour and Teece found "strong statistical support for the M-form hypothesis." They estimated that during the earlier period (1955-1968) the M-form structure outperformed the functional structure by about two percentage points of return on equity, (i.e., approximately 9 1/2% versus approximately 7 1/2%). Furthermore, the superior performance of the M-form structure did not persist into the latter period (1969-1973).

3. M-form Structure and Financial Performances

The purpose of this section is to develop a working hypothesis relating the M-form hypothesis to financial performances. It should be noted that the present paper does not seek to develop a theory of financial market performance and organization structure. Such a theory is a most substantial undertaking given the present understanding of organization structure. Our purpose is more modest. The primary focus is empirical and exploratory. The research question is: What impact if any does the M-form structure have relative to a functional structure on the financial performance of a firm? In support of this question a working hypothesis was developed.

We are largely in agreement with Armour and Teece that abnormal returns will be capitalized into the value of a firm's securities at a rapid pace. As a result it would be difficult, but not impossible, to isolate and measure these returns. Isolating these returns would become increasingly difficult as the M-form structure diffused since the participants in the capital markets would be likely to anticipate adoption and its impact at an early point relative to actual adoption.

However the basic characteristics ascribed to the M-form structure suggest that they may alter the nature of the market trade-off between risk and return. In particular two characteristics ascribed by Williamson would seem to potentially be capable of altering the risk and return perceptions of the market: (1) superior information and control techniques and (2) the separation of strategic and operating decision-makings.

The basic nature of risk is uncertainty about the future value of some variable. For a firm as a whole or a division of a firm salient variables would include profits, cash flow, competitor moves and responses, future demand, production costs, etc. To the extent that the superior information

techniques ascribed to the M-form structure can reduce uncertainty, risk can obviously be reduced. Furthermore, this reduction of risk should ultimately be reflected in the cash profit stream of the firm since the lessened uncertainty should result in more timely and better decisions. The superior control techniques should display the same characteristics since they imply the improved ability of top management of the firm to monitor performance of businesses and managers and hence make corrections (i.e., intervene) in a timely fashion.

The separation of strategic and operating decision-makings should also have impact on the riskiness of the firm. Without, this separation what characteristically occurs is that immediate operating decisions displace management attention from the less immediate but more critical strategic decisions regarding capital allocation. Delays in making strategic decisions, many of which have long implementation horizons, (e.g., establishment of a manufacturing facility in a low-wage country) can significantly increase the riskiness of the firm's cash profits. Separation allows both classes of problems to be dealt with more effectively and more appropriately.

So far the argument has been that some basic characteristics of the M-form structure in equilibrium result in a reduction of the variability of cash profits. Furthermore, since Beaver, Kettler and Scholes (1970) showed that the variance of a firm's accounting returns was related to its systematic risk, a reduction of a firm's systematic risk should also be associated with the adoption of the M-form. This conclusion was adopted as a working hypothesis.

4. Methodology

The evaluation and comparison of any investment or financial performance cannot be based on the average returns alone. To provide a more proper basis

for comparison among investment alternatives an investment performance measure must combine risk measures with returns, because participants in capital markets are generally risk averse and because risk differs among various investment types.

The methodology for performance evaluation employed in this study is founded on Markowitz's (1952) pioneering work in portfolio theory. The concepts of portfolio diversification and efficiency developed by Markowitz are the basis of modern capital market theory. Based on this successive work, it is generally accepted that an efficient portfolio must have the highest expected return for a given level of risk or the lowest level of risk for a given level of expected return. Therefore, to assess a proper measure of investment performance, the realized average return of a portfolio over a given time period must be adjusted for the risk of the returns in the portfolio over the same time period.

Total risk and market risk are two commonly used measures of risk in the evaluation of financial performance. The total risk of a portfolio is usually measured by the standard deviation of returns; while the market risk is measured by the beta coefficient (see discussion of the capital asset pricing model below) estimated for the security or portfolio. This coefficient, in turn, is measured by the covariance of the portfolio and market returns, divided by the variance of the market return. Beta indicates the sensitivity of the return with respect to the movement of the return on the market portfolio.

Based on Markowitz's mean-variance portfolio analysis, Sharpe (1966) derived the reward-to-variability index for investment performance evaluation. The Sharpe index of performance is defined as the ratio of the average excess return over a given period to the standard deviation of the excess returns,

where excess returns are usually defined as the extent to which returns on a given investment exceed the risk-free rate of interest. This index is defined as follows:

$$SI = \frac{\bar{R}_j - R_f}{\sigma_j}, \tag{1}$$

where SI = the Sharpe index of performance;

$\bar{R}_j$ = the average return on security or portfolio j;

R_f = the risk-free rate of interest;

σ_j = the standard deviation of excess returns on security or portfolio j.

The Treynor index (see Treynor, 1965) is similar except it substitutes the systematic risk for the standard deviation in the denominator.

Sharpe (1964), Lintner (1965) and Mossin (1966) extended Markowitz's portfolio theory and derived the equilibrium capital asset pricing model (CAPM). The CAPM states that, in equilibrium, the expected return on any asset or portfolio is related to both the riskless rate of interest and the return on the market portfolio as follows:

$$E(R_j) = R_f + \beta_j[E(\tilde{R}_m) - R_f], \tag{2}$$

where $\tilde{R}_j$ = the random rate of return on the jth asset or portfolio;

$\tilde{R}_m$ = the random rate of return on the market portfolio;

β_j = Cov $(\tilde{R}_j, \tilde{R}_m)$/Var $(\tilde{R}_m)$, the beta coefficient or systematic risk of the jth asset or portfolio.

Based on the CAPM shown in Equation (2), Jensen (1968) developed the following ex-post relationship between the actual risk premium on a portfolio and that on the market portfolio for the purpose of evaluating investment performance:

$$R'_{jt} = \alpha_j + \beta_j R'_{mt} + \varepsilon_{jt}, \tag{3}$$

where R'_{jt} = the excess rate of return, $R_{jt} - R_{ft}$, on asset or portfolio j in period t;

R'_{mt} = the excess rate of return, $R_{mt} - R_{ft}$, on the market portfolio in period t;

α_j, β_j = the intercept and slope terms, respectively, of a least squares regression line;

ε_{jt} = the random error term with $E(\varepsilon_{jt}) = 0$.

Alpha (α) in Equation (3) is Jensen's index of performance. A positive alpha indicates a superior performance of the investment relative to an unmanaged portfolio of similar market risk, while a negative alpha will indicate the portfolio's inferior performance, given its market risk.

5. The Data, the Analysis and the Results

In order to examine how adoption of the M-form organization structure is related to a firm's financial performance, Armour and Teece's (1978) sample of firms from the oil industry was reanalyzed using capital market data on stock returns. Monthly returns for each firm were obtained from the CRSP tapes. Adequate returns were only available on this tape for a total of 13 firms out of the original sample of 28 petroleum firms. The final sample appears in Table 1.

For each firm an initial analysis period was defined as the four years immediately before the transition period. During this period a firm was organized along lines other than the M-form structure. Similarly an M-form analysis period was defined as the four years immediately after the transition to the M-form structure. (These three periods for each firm are shown in Table 1.) This procedure resulted in a wide diversity of time periods among the firms for each analysis period. Hence, we are confident that organizational

structure effects were not confused with trends in the risk and returns of the petroleum industry (i.e., temporal industry effects). For four of the firms the M-form analysis period was shortened by stopping with August 1973 since shortly thereafter the Arab oil embargo disrupted the petroleum industry and substantially altered the riskiness and returns of the petroleum industry.

For each of the firms the mean return, the standard deviation of returns, the systematic risk, and Sharpe, Treynor, and Jensen measures of financial performance were estimated. For the regression a value-weighted market index was used. Table 2 lists the mean ($\bar{X}$), standard deviation ($\hat{s}$), and coefficient of variation for each firm for both the initial and the M-form periods. Similarly, the systematic risk estimates and the R^2 for the estimating regressions are shown in Table 3. Table 4 contains the estimates for the Sharpe and Treynor indices and the Jensen measure. Table 5 summarizes the average magnitudes across firms of relevant estimates while Table 6 shows the binomial probability of the number of increases encountered for each measure in going from the initial period to the M-form period. In sum, these tables suggest that overall returns, systematic risk and the coefficient of variation decline with the introduction of an M-Form organization structure.

In addition to studying the impact of adopting the M-form structure, the performance in equilibrium of a sample of firms using the M-form structure versus a sample of firms using the functional structure was studied. For the four year period 1961-1965 the sample included four firms using an M-form structure and four that were not but were using some form of functional organization (see Table 7). Tables 7, 8, and 9 compare these two groups of firms on the basis of all the measures discussed earlier. The results indicate no differences between these two groups of firms.

6. Discussion

Given the small sample size and single industry composition any conclusions must be tentative. However, given the fundamental importance of the choice of organization structure in the managerial literature and the lack of systematic study of the relationship between organizational structure and financial performance, the results can be most useful in structuring new, more refined, and powerful hypotheses and empirical investigations. Furthermore, the results are suggestive of conclusions that may be fundamentally important in furthering our understanding of the economic role of organizational structure. Hence the results and the related discussion are offered in the hope of stimulating further investigation and discussion rather than as a comprehensive and definitive study.

The evidence in Tables 5 and 6 suggest that average monthly returns decline as a result of adoption of the M-form organization. This is probably related to the decline in systematic risk that these tables also suggest. The returns caused by movement of the market would decline because of the decline of systematic risk and it is probably this component of overall returns that are causing them to decline. This explanation is further reinforced in Tables 5 and 6 because total risk does not seem in general to decline when the M-form structure is introduced.

The association of a decline in systematic risk with the introduction of the M-form structure would seem to be the most important result suggested by the analysis. This is the result that the working hypothesis developed on the basis of the basic properties of the M-form structure as discussed by Williamson. One of the most basic implications of this result is that adoption of the M-form structure could be expected to lower the cost of equity and hence the cost of capital to the firm. Therefore a firm adopting the M-form

structure (assuming that such a structure was appropriate) would be able to accept an increased number of investment projects and would have the opportunity to expand to a larger size than under a functional structure. From an economy-wide perspective it would seem that policy should encourage (or at a minimum not discourage) the appropriate adoption of the M-form structure, since such adoption will stimulate investment and hence employment and welfare.

The fact that the study dealt only with the petroleum industry puts some limits on the generalization of results. However, it should also be noted that dealing with a single industry does have advantages. In particular the potential impact of differential industry effects on the firms' systematic risks need not be considered. Furthermore, the impact of adoption of the M-form structure may vary across industries since the importance of the advantages of the M-form structure may vary across industries. Studies that separate the industry impact from the firm impact are needed.

One particular feature of the petroleum industry sample used in this study deserves further comment. The petroleum industry is one in which vertical integration is prominant. The firms in the sample are highly vertically integrated. Hence the M-form structure will result in divisionalizing the vertical chain (e.g., exploration division, marketing division, refining division, etc.). However, because it is a vertical chain it will still be necessary to coordinate the scale and activities of each stage with the other. An appropriate transfer pricing scheme can go a long way toward achieving proper coordination. This leaves some doubts in the authors' minds. Can a management team be expected to buy or sell outside of the corporation when by so doing they may force a reduction in scale of another division even though such a reduction is economically valid? We think it rather more likely that

there will be a residual bias in favor of inappropriate internal transaction, especially when the managers have operated under a functional structure for many years prior to adoption of the M-form structure. Such biases will no doubt decay over time (the market will insist on this!) but in the interim the full potential of the M-form structure is unlikely to be recognized. This argues that the results of this study may be somewhat muted. Studies in other industries that are not vertically integrated or of horizontally diversified or conglomerate firms are likely, we think, to find more dramatic results.

One of the more bothersome aspect of the results is the failure of the analysis summarized in Tables 7, 8, and 9 to find a difference in firms utilizing the M-form structure versus other structures. The very small sample sizes are likely to be playing a role but another explanation can also be advanced. It may be that during the diffusion of the M-form structure that early adopters (those in our sample with the M-form structure during 1961-1965) were sorely in need of the performance improvement associated with the structure, while later adopters (those that did not utilize the M-form structure during 1961-1965) were performing satisfactorily under the functional structure during the early diffusion period. In other words firms adopt the M-form structure in response to the pressures of poor performance. This is a researchable question worthy of further study.

This paper has sought to expand on the work of Williamson (1970, 1975, 1981), Armour and Teece (1978), Teece (1981), and Steers and Cable (1978) to develop a tentative hypothesis about the relationship between organizational structure and financial performances. The results suggest that the M-form structure can lower the systematic risk of a firm. This tentative conclusion deserves further study using other industries and larger samples. The managerial literature has generally emphasized the importance of organizational

structure while the literature of financial economics has concentrated on financial performances. The works of Williamson (1970, 1975, 1981) are suggestive of possible connections between the two. The current paper aims to establish a tentative empirical linkage that will stimulate further studies.

Table 1

Performance Measurement Periods

	Initial Period	Transition	M-Form
Ashland Oil	1963-1966	1967-1969	1970-1973
Belco Petroleum	1965-1968	--	1969-1973
Union Oil of California	1959-1962	1963	1964-1967
Cities Service	1962-1965	1966	1967-1970
Exxon	1956-1959	1960-1965	1966-1969
Getty Oil	1955-1958	--	1959-1962
Gulf Oil	1953-1956	1957	1958-1961
Marathon Oil	1956-1959	1960-1962	1963-1966
Mobile Oil	1955-1958	1959	1960-1963
Occidental Petroleum	1965-1968	1968-1971	1972-1973
Standard Oil (California)	1950-1953	1954	1955-1958
Sun Company	1965-1968	1968-1970	1971-1973
Standard Oil (Indiana)	1953-1956	1956-1960	1961-1964

Table 2

Return Statistics (All Firms)

	Initial Period			M-Form		
	$\bar{X}$	$\hat{s}$	$\left\lvert \frac{\hat{s}}{\bar{X}} \right\rvert$	$\bar{X}$	$\hat{s}$	$\left\lvert \frac{\hat{s}}{\bar{X}} \right\rvert$
Ashland Oil	.0236	.0470	2.008	.0133	.0796	5.985
Belco Petroleum	.0288	.1063	3.691	-.0117	.1235	10.556
Union Oil of California	.0192	.0534	2.781	.0141	.0710	5.035
Cities Service	.0132	.0410	3.106	.0052	.0715	13.750
Exxon	.0039	.0474	12.154	-.0001	.0949	494.000
Getty Oil	.0173	.1204	5.919	-.0044	.0912	20.727
Gulf Oil	.0279	.0749	2.684	.0089	.0577	6.483
Marathon Oil	.0083	.0749	8.980	.0118	.0506	4.288
Mobil Oil	.0073	.0123	1.685	.0169	.0525	3.106
Occidental Petroleum	.0477	.1352	2.834	-.0146	.0990	6.781
Standard Oil (California)	.0189	.0488	2.582	.0149	.0554	3.718
Sun Company	.0180	.0473	2.628	.0038	.0549	14.447
Standard Oil (Indiana)	.0126	.0603	4.786	.0176	.0597	3.392

Table 3

Market Model Regression Estimates (All Firms)

	Initial Period		M-Form	
	β	R^2	$\hat{\beta}$	R^2
Ashland Oil	.9669	.29	.7869	.18
Belco Petroleum	1.5990	.26	1.8010	.37
Union Oil of California	1.1051	.15	.7282	.39
Cities Service	.6007	.27	.5159	.10
Exxon	1.0722	.55	.6295	.23
Getty Oil	1.7587	.34	1.5527	.45
Gulf Oil	1.4911	.44	.8876	.19
Marathon Oil	1.3137	.33	.6924	.13
Mobil Oil	.9327	.35	.6917	.28
Occidental Petroleum	1.3771	.08	1.5427	.52
Standard Oil (California)	1.0926	.48	1.2800	.62
Sun Company	.5761	.12	.5648	.10
Standard Oil (Indiana)	1.3700	.51	.9361	.32

Table 4

Performance Measures (All Firms)

	Initial Period			M-Form		
	Sharpe Index	Treynor Index	Jensen Measure (Significance)	Sharpe Index	Treynor Index	Jensen Measure (Significance)
Ashland Oil	0.433	0.0213	.015 (.012)	0.115	0.0117	.005 (.712)
Belco Petroleum	0.236	0.0156	.017 (.219)	-0.131	-0.0090	-.018 (.205)
Union Oil of California	0.169	0.0109	.007 (.381)	0.296	0.0216	.011 (.126)
Cities Service	0.256	0.0175	.007 (.181)	0.007	0.0010	.000 (.962)
Exxon	0.040	0.0017	-.007 (.164)	-0.006	-0.0005	.000 (.977)
Getty Oil	0.152	0.0090	-.003 (.826)	-0.071	-0.0042	-.013 (.192)
Gulf Oil	0.341	0.0173	.005 (.554)	0.123	0.0080	-.005 (.527)
Marathon Oil	0.084	0.0048	-.004 .636)	0.172	0.0126	.005 (.475)
Mobile Oil	0.104	0.0060	-.004 (.518)	0.279	0.0213	.011 (.110)
Occidental Petroleum	0.328	0.0321	.037 (.067)	-0.195	-0.0125	-.019 (.062)
Standard Oil (California)	0.362	0.0162	.005 (.346)	0.237	0.0103	.000 (.947)
Sun Company	0.311	0.0253	.011 (.097)	0.005	0.0005	-.005 (.646)
Standard Oil (Indiana)	0.191	0.0084	-.009 (.173)	0.255	0.0163	.007 (.325)

Table 5

Average Performance Measure

	Initial Period	M-Form
$\overline{X}$	0.0190	0.0058
$\hat{s}$	0.0669	0.0739
$\hat{\beta}$	1.739	0.0970
Sharpe Index	0.231	0.008
Treynor Index	0.0143	0.006

Table 6

Shift in Measures from Initial Period to M-Form (All Firms)

Measure	Number of Increases/Decreases	Binomial Probability[1]
$\bar{X}$	3 (increases)	.046
$\hat{s}$	5 (decreases)	.290
$\left\|\frac{\hat{s}}{\bar{X}}\right\|$	2 (decreases)	.011
$\hat{\beta}$	3 (increases)	.046
Sharpe Index	4 (increases)	.133
Treynor Index	4 (increases)	.133

[1]This is the cumulative binomial probability of this number or fewer increases/decreases given that an a priori probability of 0.5 is assigned to an increase or a decrease.

Table 7

Return Statistics (1961-1965)

	$\bar{X}$	$\hat{s}$
Not M-Form Structure		
Ashland Oil	.0200	.0484
Sun Company	.0110	.0390
Occidental	.0263	.1005
Cities Service	.0126	.0414
Belco Petroleum	.0161	.0654
M-Form Structure		
Getty Oil	.1092	.0931
Gulf Oil	.0136	.0507
Standard Oil (Indiana)	.0167	.0563
Standard Oil (California)	.0145	.0399
Mobil Oil	.0198	.0497
Averages		
Not M-Form	.0172	.0589
M-Form	.0167	.0579

Table 8

Market Model Regression Estimates (1961-1965)

	$\hat{\beta}$	R^2
Not M-Form Structure		
Ashland Oil	.851	.36
Sun Company	.450	.15
Occidental	2.01	.16
Cities Service	.610	.25
Belco Petroleum	.832	.13
M-Form Structure		
Getty Oil	1.59	.34
Gulf Oil	.938	.40
Standard Oil (Indiana)	.783	.22
Standard Oil (California)	.552	.22
Mobil Oil	.715	.24
Averages		
Not M-Form	.951	.21
M-Form	.916	.28

Table 9

Performance Measures (1961-1965)

	Sharpe Index	Treynor Index	Jensen Measure (Significance)
Not M-Form Structure			
Ashland Oil	0.362	0.0206	0.010 (.051)
Sun Company	0.218	0.0188	0.005 (.332)
Occidental	0.231	0.0115	0.008 (.735)
Cities Service	0.244	0.0166	0.005 (.304)
Belco Petroleum	0.203	0.0160	0.003 (.802)
Average	0.251	0.0167	
M-Form Structure			
Getty Oil	0.179	0.0104	0.003 (.744)
Gulf Oil	0.219	0.0118	0.03 (.548)
Standard Oil (Indiana)	0.250	0.0180	0.11 (.059)
Standard Oil (California)	0.300	0.0217	0.007 (.126)
Mobil Oil	0.345	0.0240	0.008 (.261)
Average	0.258	0.0172	

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