EXTRA-MARKET COMPONENTS OF SECURITY RETURNS: SOME EMPIRICAL EVIDENCE

by

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Extra-Market Components of Security Returns: Some Empirical Evidence

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ABSTRACT

Systematic formation of portfolios of securities requires a knowledge of the covariance structure of security returns. The simplest model of the covariance structure is the market model, or single-index model, which asserts that comovements of security returns are captured through the common influence of the market. While the market model explains a portion of the comovements of security returns, it seems to have overlooked the more subtle aspects of return covariation that are specific to certain groups of, but not all, securities.

The paper examines the behaviour of the residuals from the market model in order to isolate security groups with homogeneous extra-market return patterns using cluster analysis and to assess the statistical significance of the extra-market components using regression analysis.

The results show that specific security groups, i.e., growth, cyclical, stable and energy stocks, exhibit highly significant influences on non-market related security returns. These findings pose some questions about the accuracy of the assumption of cross-sectional independence of securities' residual returns in the market model.

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I. Introduction

It is frequently observed that most securities appreciate in value in market upswings and depreciate in economic downturns. Sharpe (1963) formalized this idea by postulating a linear model, known as the market or single-index model, relating a security's return to the market's performance. In the market model, security (portfolio) return and risk can be decomposed into two components; market-related and firm-specific. Furthermore, securities are assumed to be correlated only because they are influenced by the market. The covariance of the non-market related returns between any two securities is assumed to be zero. An important implication derived from this model is that the firm-specific, or unsystematic, risk of a portfolio can be eliminated by properly diversifying the portfolio holdings so that the unsystematic components cancel each other out. On the other hand, the market-related, or systematic, risk inherent in a portfolio can not be removed.

While the market model explains a portion of the variation in a security's return, it seems to have overlooked the more subtle aspects of other possible influences on security return behaviour. In particular, it fails to recognize features that are common tc many but not all securities. For example, it is intuitively clear that returns of two securities with many

similar economic characteristics are bound to be more closely related than two securities with dissimilar economic characteristics. Thus, many financial theorists and practitioners believe there exist some systematic extra-market influences on security returns not described by the market model, such as industry effects or homogenecus security groups effects. In practice, it is observed that a portfolio manager frequently attempts to diversify his portfolio by holding securities of industries from across the broad market. Thus, the interest in the extra-market effects is in breaking down the market model's residual returns into finer components. The motivation for the search for extra-market covariation is clear: if an investor can incorporate this information to make predictions about performances of individual securities and portfolios that are consistently better than the average investor, he will be able to reap excess profits.

Several studies on extra-market components have been documented in the finance literature. Of the more important studies, King (1966) and Meyers (1973) investigated and reported statistical significance of industry factors on security returns. Cohen and Pogue (1967) and Elton and Gruber (1973) evaluated the relative performances on different Mean-Variance (MV) portfolio selection models. Farrell (1974), in an attempt to isolate homogeneous groupings, found statistically significant security groupings while examining the covariation of security returns. This literature will be discussed in

greater detail in the following chapter.

It is the purpose of this study to investigate market model residual returns in order to isolate extra-market components of security returns. The study adopts Farrell's approach of identifying homogeneous security groupings or "pseudo-industries" via cluster analysis. The study then extends Farrell's work to include more formal testing for these extra-market components of security returns over an extended period. The study reports the responsiveness coefficients of securities to changes in pseudo-industry indexes and the statistical significance of these coefficients. A key part of the motivation for the analysis is that the coefficients of limited index model may be helpful in incorporating extra-market components for prediction purposes.

The paper proceeds as follows. Section 2 surveys some of the related empirical studies. Section 3 examines the theoretical framework of the study. Section 4 discusses the methodology. Section 5 presents and discusses the empirical results. Section 6 summarizes the findings of the paper.

II. Some Related Empirical Studies

Dissatisfaction with the adequacy of the market model as a model for describing security returns behaviour has led to several studies focusing on securities' residual return patterns. King investigated the return behaviour adjusted for a market factor, i.e., the first factor obtained from factor analysis, for a sample of sixty three securities from six industries classified under the Standard Industrial Classification (SIC) codes. He found that most extra-market return covariances for securities within industries were significantly different from zero and concluded that industry factors played an important role in explaining a security's return. King's results indicated that the market factor accounted for about a third to a half of a security's systematic return variation; while, on average, industry factors accounted for an additional ten percent.

Meyers conducted similar tests for the presence of the industry factors documented by King using sixty of the sixty three securities in King's sample. His evidence supported King's results that the residual components of security returns could not be assumed to be cross-sectionally independent. However, he suggested that King overstated the role of the industry factors in his small sample. When Meyers conducted the same test on twelve industries with five securities drawn randomly from each

industry, he observed that some components of security returns were quite independent of the firms' SIC classification. This evidence suggested the presence of other sources of nonmarket influences not related to industries.

Cohen and Pogue (1967) evaluated the relative performances of the full-covariance,[1] market, and multi-index models in selecting Mean-Variance efficient portfolios. They used SIC codes to classify a 543-security universe into ten industries. An industrial index was constructed for each industry by computing the unweighted arithmetic average of returns for all securities in the industry. These industrial indexes were used as the additional index inputs in multi-index models. Somewhat surprisingly, they concluded that the multi-index models did not, ex ante, outperform the market model in generating efficient sets of portfolios, despite the theoretical idea that the additional indexes were supposed to capture some of the extra-market influences on securities co-movement.

Elton and Gruber (1973) tested for the statistical and economic significance of these industry factors in terms of their ability to predict the future correlation matrices of security returns. Once again, their results showed that adding additional indexes did not lead to an improvement in performance.

Perhaps the above evidence indicates some shortcomings of the tranditional SIC classification system for studying residual

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[1] Markowitz (1952).

returns. Elton and Gruber noted two obvious problems with the SIC classification. "One is that the increase in the number of multi-product firms and the prevalence of company diversification have made classification by product difficult and, sometimes, arbitrary. Second, and even more important, classification by product or service may be useful for some purposes but it is far from a universal classification for all purposes. For example, General Motors and American Motors are in the same industry but there are major differences in their performance and the risk to which they are subject." [2] Hence, an alternative method of classification to study the non-market effects is to group firms according to their tendency to act alike in homogeneous groups or "pseudo-industries".

Farrell (1974) hypothesized that, in addition to industry effects, securities can be classified into homogeneous groups of growth, stable, cyclical, and energy stocks. He regarded growth stocks as securities which have an expected above average rate of return during the expansionary phase of the economy. Cyclical stocks are securities which have an above average exposure to influences of the business cycle. The earnings of cyclical firms are expected to be above average in an economic boom and below average in a recession. Stable stocks, on the other hand, exhibit counter-cyclical earnings behaviour. Energy stocks are securities whose earnings depend very much on the economy's aggregate demand for and supply of energy and the relative

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[2] Elton and Gruber (1981,pp.146)

prices of energy.[3] He tested and found statistical significance of the hypothesized homogeneous security groups from a stratified sample of one hundred securities across industries. He reported that the market influences, proxied by the generally used Standard and Poor 500 stock index, explained about thirty percent of a security return variation on average. He then constructed indexes for pseudo-industries from the homogeneous security groupings as input to a multi-index model. An index constructed by this procedure would maximize the interdependence of residual returns within a homogeneous group. The homogeneous group influences identified by Farrell accounted for an additional 15 percent of its return variation on average.

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[3] Farrell (1982).

III. Theoretical Foundations

Portfolio theory is concerned with the selection of optimal combinations of securities or portfolios by a rational risk-averse investor from a predetermined security universe. The relevance of this selection problem is derived from the principle of diversification. Diversification offers an investor the opportunity to reduce his risk exposure without a proportional reduction in his expected return through the judicious selection of securities that are not all perfectly correlated.

In the context of Mean-Variance (MV) portfolio theory, the future performance of a security or a portfolio is measured by the expected return and variance of its return distribution. The expected return on a portfolio, E(Rp), is defined as the weighted average of all securities returns, E(Rj) for all j, included in the portfolio. The weight, Xj, on security j is determined by the proportion of the portfolio invested in that security; i.e.,

$$E(Rp) = \sum_{j=1}^{N} Xj * E(Rj) \qquad (1.a)$$

$$\sum_{j=1}^{N} Xj = 1 \qquad (1.b)$$

where N is the number of securities included in the portfolio and all weights have to sum to unity. While the variance of a portfolio is defined as:

$$VAR(Rp) = E\,(Rp-E(Rp))^2 \qquad (2.a)$$

$$= \sum_{i=1}^{N} \sum_{j=1}^{N} Xi * Xj * COV(Ri, Rj) \qquad (2.b)$$

$$= \sum_{j=1}^{N} Xj^2 * VAR(Rj) + \sum_{\substack{i=1 \\ i \neq j}}^{N} \sum_{j=1}^{N} Xi * Xj * COV(Ri, Rj) \qquad (2.c)$$

where COV(Ri,Rj) is the return covariance between security i and j.

Estimates of mean vector and the covariance matrix are required to solve an MV portfolio selection problem. The pioneering model of Markowitz, also known as the full-covariance model, requires estimates of all elements in the variance-covariance matrix of security returns. In a N-security universe, the number of estimates required is $2N+N(N-1)/2$, which consists of N expected returns, N variances, and $N(N-1)/2$ covariances. But the major difficulties with this model are the number of estimates that must be made and the computational problems as the security universe becomes larger.

A simplified model has been suggested by Sharpe (1963). The model, known as the market (or diagonal or single-index) model, has been the most widely used model in the investment community to this date. The popularity of the market model can be attributed to two factors: simplicity and computational ease. It asserts a linear relationship between a security return and the market of the form:

$$Rjt = \alpha j + \beta jm \; Rmt + ejt \qquad (3.a)$$

where αj is the average return of security j not related to

the market index for time t, β jm is a measure of responsiveness of security j to changes in the market for time t, and ejt is a random error term with zero mean and a constant variance.

More specifically, it is assumed that:[1]

$$E(ejt) = 0 \qquad (3.b)$$

$$E(ejt, Rmt) = 0 \qquad (3.c)$$

$$E(eit, ejt) = VAR(ej) \quad \text{for } i=j \qquad (3.d)$$

$$E(eit, ejt) = 0 \quad \text{for } i \neq j \qquad (3.e)$$

Applying this model requires only 3N+2 estimates;i.e., N estimates of α j, β jm, VAR(ej), and the expected return and variance on the market return. The first three of these estimates can be obtained inexpensively by the ordinary least squares regression method. The substantial reduction in the estimation task that outlines the fundamental difference between the market model and the full-covariance model lies in (3.e), which states that security non-market returns are cross-sectionally independent. The implication of (3.e) is that the only common co-movements between securities are due to the common market effects. Clearly, the assumption in (3.e) must be an approximation. Therefore, this paper investigates some intermediate cases where the extra-market components of returns are modelled in a simple understandable way.

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[1] It is also implicitly assumed that security's return is distributed identically and independently over time.

IV. Methodology and Data

The research approach employed in this study consists of three phases. It parallels that of Farrell (1974). First, it attempts to replicate Farrell's cluster analysis over an extended study period to identify homogeneous security groups. Its purpose is to ensure consistency of results and to provide a basis for evaluation of subsequent tests. Second, it extends Farrell's work to include more formal testing for the significance of the homogeneous security groups. Third, it estimates the individual security responsiveness coefficients to the security group indexes.

However, there are three minor differences between this study and Farrell's. First, four securities (namely American Metal Climax, Babcock Wilcox, Gardner Denver and Otis Elevator) for which a substantial part of data is missing have been replaced by four major oil companies (namely Atlantic Richfield, Continental Oil, Phillips Petroleum and Sun Oil). Second, the replication covers a period from July 1965 to December 1980 during which data is complete for all securities under investigation. Third, the study uses a CRSP value-weighted index as a proxy for the market instead of the Standard and Poor 500 index used by Farrell. The CRSP index is computed by averaging the monthly returns on all securities listed on the NYSE with individual securities weighted by their relative outstanding

market values.

Cluster Analysis

Cluster analysis is used to classify securities with similar residual return patterns into homogeneous security groups of pseudo-industries. First, the common market effect embedded in each security's return is removed via regression (3.a). Then the clustering algorithm starts by treating each security as a cluster and searches for the pair of securities, i and j, with the highest positive residual correlation coefficient. When the pair is identified, a new cluster is formed by combining the two clusters with weights proportional to the number of securities in each cluster. The next iteration begins by searching for the highest positive residual correlation coefficient of the new cluster and the remaining clusters. At each iteration, the number of the remaining clusters is sucessively reduced by one. If there are indeed G groups of securities exhibiting homogeneous residual return patterns, G distinct clusters should emerge by the N-Gth iteration.

Regression Analysis

If extra-market components are present in security returns and are an integral part of the return behaviour, it would be implausible to ignore them in modelling the securities' return behaviour. The inadequacy of the market model in this respect leads to the pursuit of an alternative model. A logical proposal would be to extend the market model so that a security's return is related not only to the market but also a pseudo-industry group (adjusted for the general market effect). Formally, it means the following model specification:

$$R_{jt} = \alpha_j + \beta_{jm} R_{mt} + \beta_{jk} I_{kt} + u_{jt} \quad \text{for } j \in k \quad (4)$$

where β_{jk} is a measure of the responsiveness of security j return to changes in its pseudo-industry's performance indicated by an index, Ikt, at time t;[1] and ujt is a random error term with zero mean and a constant variance. From this model, a

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[1] The index for security group k is the unweighted arithmetic average of all its composite security returns. The market influence is again removed from the indexes via (3.a) to avoid the multicollinearity problem since statistical tests on the regression coefficients obtained from highly collinear explanatory variables are unreliable. The resulting residual index, Ikt, would represent returns that are unique to pseudo-industry k and unrelated to the market. An alternative approach to forming the group indexes would have involved value weighting. This would be desirable if we are working with the whole universe of stocks. However, with only one hundred stocks, either way of weighting is at best an approximation. We leave it to further research to explore the value-weighted versus equal-weighted index question.

testable propositicn is derived.

Hypothesis 1

If the assumption, E(eit,ejt)= 0 for i≠j, of the market model which states that residual returns on two securities, i and j, at time t are not related cross-sectionally holds, this implies that regressing (3.a) with an additional orthogonal index, Ikt, should add no significant explanatory power.[2] More specifically, the regression coefficent, β jk, of (4) is expected to be statistically no different from zero since the market model would regard the additional index irrelevant. The null hypothesis(Ho) and the alternative hypothesis(H1) can be stated as:

Ho : β jk= 0 for j∈k

H1 : β jk≠ 0 for j∈k

Of course, a similar argument can be applied if we assumed that a security's return responds to the performances of a larger set of pseudo-industries in addition to its own. For example, some pseudo-industries may be correlated with some others because certain extra-market factors may be affecting more than one security group, but not all. For this reason, the responsiveness of an individual security's return to the performances in all pseudo-industries also have to be estimated

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[2] The index has been designed to maximize the interdependent structure of securities' residual returns within a homogeneous group.

via the following model:

$$R_{jt} = \alpha_j + \beta_{jm} R_{mt} + \beta_{j1} I_{1t} + \beta_{j2} I_{2t} + \ldots + \beta_{jG} I_{Gt} + v_{jt}$$

$$\text{for } g = 1, 2, \ldots, k, \ldots G \qquad (5)$$

where β_{jg} measures the responsiveness of security j to changes in index for pseudo-industry g, I_{gt}. [3]

The preference is, nevertheless, for the two-index model of Hypothesis 1 because security residual returns within a homogeneous group are expected to be positively and highly correlated, while inter-group securities have only low and limited extra-market return correlations. This idea can be formalized and tested in the form of:

Hypothesis 2

$$H_o : \beta_{jg} = 0 \qquad \text{for } j \in k \text{ and } g \neq k.$$

$$H_1 : \beta_{jg} \neq 0 \qquad \text{for } j \in k \text{ and } g \neq k.$$

Another way of motivating the same hypothesis is as follows. If the cluster analysis has really formed securities into orthogonal groups, the securities within a group should be related to the group index but should not be related to any

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[3] (4) can be regarded as a restrictive version of (5). Using dummy variables, Dg, (4) can be expressed as:

$$R_{jt} = \alpha_j + \beta_{j1} D_1 I_{1t} + \ldots + \beta_{jG} D_G I_{Gt} + u_{jt} \quad ; \text{ and}$$

Dg = 1 if security j is classified in security group g;
= 0 otherwise.

$$\text{for } g = 1, 2, \ldots, k, \ldots, G. \qquad (4.a)$$

orthogonal group's index.

Data

Data used for this study is extracted from the CRSP monthly data file developed by the Centre for Research in Security Prices of the University of Chicago. It consists of monthly returns, price changes plus dividends, for one hundred securities included in the study sample for the period from July 1965 through to December 1980.

V. Results

Cluster Results

The cluster results are presented in Figure 1. The presence of extra-market components is clearly evident. Farrell's growth and stable groups re-emerged intact, except that a few cases of inter-group migrations of securities have been observed. These migrations are likely to have resulted from changes in the firms' economic characteristics since the time period studied by Farrell. For example, one might expect that as it matures, a growth stock would migrate to one of the other three groups. It is noted that these inter-group migrations have also been observed by Farrell (1982) and Grauer and Herzog (1979). [1] Rather surprisingly, the energy stocks were found clustered between two groups of cyclical stocks. This observation suggests that more than one homogeneous security group may be present in the cyclical stocks. In general, the cluster results can be described as follows. Securities 1-12 and 25-49 can be regarded as cyclical stocks. Securities 13-24 are the energy group. Securities 50-65 can be termed as stable securities. The

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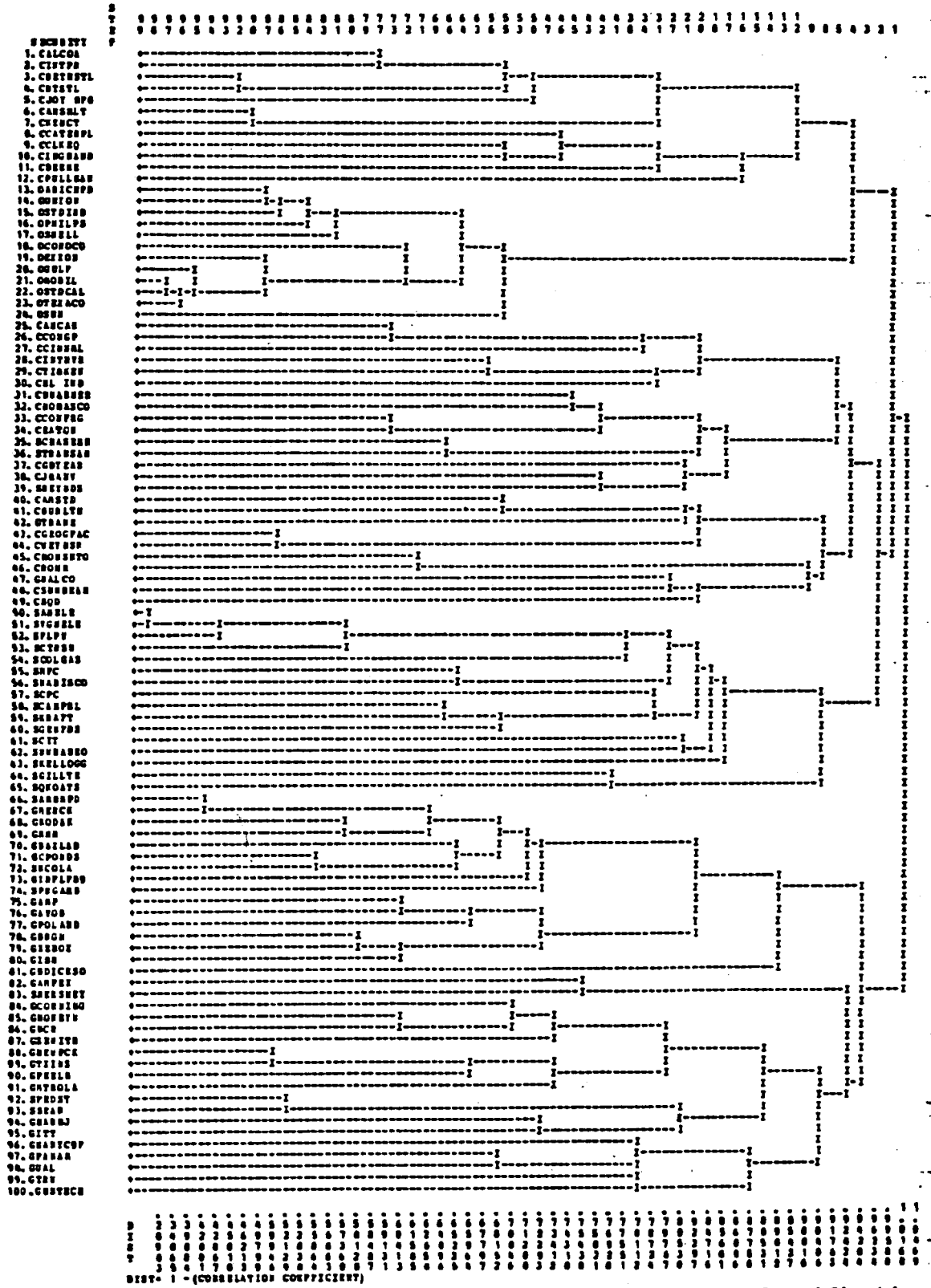
[1] Grauer and Herzog studied homogeneous security groups similar to Farrell's while investigating the impacts of the energy crisis.

remaining securities 66-100 are considered as growth stocks.

FIGURE 1

CLUSTER ANALYSIS CHART FOR THE PERIOD JULY 1965 TO DECEMBER 1980*



*The first letter of each security indicates the security classification under Farrell's terminology, i.e., C=Cyclical stocks, G=Growth stocks, O=Energy stocks and S=Stable stocks. Thus, it is easy to see the differences between our results and Farrell's by skimming the first letters of the names to see which securities are reclassified.

Regression Results

The results of testing for the significance of the extra-market components by means of regression analysis are presented in the remaining part of this section. [2] There are essentially two major types of results. Comprehensive regression results for the single-index, two-index and five-index models are reported in Appendices A, B and C, respectively. The information in the appendices is then summarized in Tables 1, 2 and 3. The results in the summary tables are discussed in the text, while the reader is referred to the appendices for the more detailed results.

Table 1 summarizes the relative explanatory powers of the single-index, two-index, and five-index models in acccunting for securities' return behaviour in terms of the coefficients of determination adjusted for the degrees of freedom ($\bar{R}^2$). These models explain, on average, about 35%, 46%, and 48%, respectively, of the systematic variation of a security's return. The latter two models clearly show their superiority in explaining security return patterns. The results are consistent with those of King's, Meyers', and Farrell's.

Table 2 shows the statistical significance (at the 5% significance level) of the regression coefficients for the three

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[2] For simplicity, securities included in each security group for constructing pseudo-industry indexes have been based on Farrell's security classification.

models.[3] As expected, all estimated market betas for the three models are statistically significant. The intercepts are, by and large, insignificantly different from zero, with the exception of those in the energy group. Seven of the twelve intercepts estimated using both the two-index and five-index models in the energy group are significantly positive. Panel B of Tables 2 and 3 show that all securities are significantly related to the market index and security's own pseudo-industry index for the two-index model. Hence, the results support the hypothesis that a security's return is not only affected by the market but also by its pseudo-industry.

A summary of the regression coefficients estimated with the five-index model is presented in Panel C of Tables 2 and 3. The results generally favour the proposition that a security's return is uniquely related to its own security group index and not to the other indexes. For instance, Panel C of Table 2 shows that at least 96 percent of the securities are significantly related to their own security groups. However, a closer examination of Panel C of Table 2 cautions that the cross-group betas cannot be ignored completely as there seem to be significant security group betas other than a security's own group beta. In the case of growth securities, as many as 32 percent of securities are found to be significantly related to security groups other than their own. Similarly, some cases of

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[3] The level of statistical significance defines the probability of erroneously rejecting the null hypothesis.

the significant cross-group betas are reported in the stable and cyclical security groups. Thus, the alternative hypothesis of Hypothesis 2 cannot be definitively rejected.

VI. Summary

The study examined the clustering patterns of market model residual returns for extra-market components. The first part of the study replicated Farrell's cluster analysis on a sample of one hundred firms over the period from July 1965 to December 1980. The results showed that most securities clustered by and large into the same homogeneous groups (growth, stable, cyclical and energy) reported by Farrell, with the possibility of a further sub-classification within Farrell's cyclical group. Group indexes were then formed and the securities responsiveness coeffients to their own and other groups were estimated with two-index and five-index models. The results indicated that a security's return is very strongly related to the market index and to its own security group index, and to a much smaller extent, to the other security group indexes. Therefore, the assumption of cross-sectional independence of market residual returns of the market model is at best only a crude approximation and probably unjustified.

TABLE 1

SUMMARY STATISTICS FOR THE COEFFICIENTS OF DETERMINATION($\bar{R}^2$)
FOR SINGLE-INDEX MODEL, TWO-INDEX AND FIVE INDEX MODEL
(JULY 1965 TO DECEMBER 1980)

	DESCRIPTIVE MEASURES				
MODEL	CASES	MIN	MAX	MEAN	STD DEV
SINGLE-INDEX	100	.200	.539	.349	.075
TWO-INDEX	100	.248	.711	.463	.101
FIVE-INDEX	100	.262	.713	.485	.098

TABLE 2

SUMMARY OF REGRESSION COEFFICIENTS SIGNIFICANT AT THE FIVE PERCENT LEVEL FOR SECURITY GROUPS FOR SINGLE-INDEX MODEL, TWO-INDEX MODEL AND FIVE-INDEX MODEL

PANEL A SINGLE-INDEX MODEL

SECURITY GROUP	CASES	INTE-RCEPT	MARKET BETA
GROWTH STOCKS	31	1	31
		3.2%	100%
STABLE STOCKS	25	0	25
		0.0%	100%
CYCLIC STOCKS	32	0	32
		0.0%	100%
ENERGY STOCKS	12	2	12
		16.7%	100%

PANEL B TWO-INDEX MODEL

SECURITY GROUP	CASES	INTE-RCEPT	MARKET BETA	GROWTH BETA	STABLE BETA	CYCLIC BETA	ENERGY BETA
GROWTH	31	3	31	31	--	--	--
		9.7%	100%	100%	--	--	--
STABLE	25	0	25	--	25	--	--
		0.0%	100%	--	100%	--	--
CYCLIC	32	0	32	--	--	32	--
		0.0%	100%	--	--	100%	--
ENERGY	12	7	12	--	--	--	12
		58.3%	100%	--	--	--	100%

TABLE 2 (continued)

PANEL C FIVE-INDEX MODEL

SECURITY GROUP	CASES	INTE- RCEPT	MARKET BETA	GROWTH BETA	STABLE BETA	CYCLIC BETA	ENERGY BETA
GROWTH	31	3	31	30	10	10	4
		9.7%	100%	96.8%	32.3%	32.3%	12.9%
STABLE	25	0	25	3	24	7	5
		0.0%	100%	12.0%	96.0%	28.0%	20.0%
CYCLIC	32	0	32	2	8	32	1
		0.0%	100%	6.3%	25.0%	100%	3.1%
ENERGY	12	7	12	0	1	1	12
		58.3%	100%	0.0%	8.3%	8.3%	100%

TABLE 3 SUMMARY STATISTICS FOR REGRESSION PARAMETERS BY SECURITY GROUPS FOR SINGLE-INDEX MODEL TWO INDEX-MODEL AND FIVE-INDEX MODEL

PANEL A SINGLE-INDEX MODEL

GROWTH STOCKS	CASES	MINIMUM	MAXIMUM	MEAN	STD DEV
INTERCEPT	31	-1.0080	1.0166	.15374	.47816
T-STAT(INTCP)	31	-1.1830	1.9720	.36120	.86126
ABS. T-STAT(INTCP)	31	0.3923	1.9720	.75835	.53133
MARKET BETA	31	.78327	1.8079	1.2347	.23491
T-STAT(MARKET)	31	8.3040	14.780	10.640	1.5101
ABS.T-STAT(MARKET)	31	8.3040	14.780	10.640	1.5101
ADJUSTED R-SQ	31	.26941	.53877	.37547	.06427

STABLE STOCKS	CASES	MINIMUM	MAXIMUM	MEAN	STD DEV
INTERCEPT	25	-1.1050	.61111	-.01475	.35862
T-STAT(INTCP)	25	-1.5580	1.5610	.07951	.69326
ABS. T-STAT(INTCP)	25	.02737	1.5610	.55551	.40712
MARKET BETA	25	.62037	1.4593	.84790	.18482
T-STAT(MARKET)	25	7.1530	12.780	9.1940	1.5358
ABS. T-STAT(MARKET)	25	7.1530	12.780	9.1940	1.5358
ADJUSTED R-SQ	25	.21485	.46627	.31056	.06989

TABLE 3(continued)

CYCLICAL STOCKS	CASES	MINIMUM	MAXIMUM	MEAN	STD DEV
INTERCEPT	32	-.53948	1.0054	.11944	.36214
T-STAT(INTCP)	32	-1.1100	1.4265	.19498	.65391
ABS. T-STAT(INTCP)	32	.05251	1.4265	.56826	.36539
MARKET BETA	32	.58159	1.4129	1.1016	.20450
T-STAT(MARKET)	32	6.8134	13.925	10.339	1.9168
ABS. T-STAT(MARKET)	32	6.8134	13.925	10.338	1.9168
ADJUSTED R-SQ	32	.19973	.50907	.36049	.08409

ENERGY STOCKS	CASES	MINIMUM	MAXIMUM	MEAN	STD DEV
INTERCEPT	12	.13380	1.1154	.65618	.27452
T-STAT(INTCP)	12	.34711	2.4614	1.4361	.54471
ABS. T-STAT(INTCP)	12	.34711	2.4614	1.4361	.54471
MARKET BETA	12	.72496	1.1098	.93822	.10552
T-STAT(MARKET)	12	7.8002	11.684	9.5993	1.1628
ABS. T-STAT(MARKET)	12	7.8002	11.684	9.5993	1.1628
ADJUSTED R-SQ	12	.24549	.42199	.32915	.05303

Table 3(continued)

PANEL B TWO-INDEX MODEL

GROWTH STOCKS	CASES	MINIMUM	MAXIMUM	MEAN	STD DEV
INTERCEPT	31	-1.0080	1.0170	.15668	.47840
ABS. T-STAT(INTCP)	31	.06100	2.2190	.84026	.60092
MARKET BETA	31	.78300	1.8080	1.2349	.23475
ABS. T-STAT(MARKET)	31	8.7770	15.410	11.636	1.7228
SEC GROUP BETA	31	.44400	1.6430	1.0003	.34310
ABS. T STAT(GROUP)	31	2.5970	9.8680	5.8876	1.8847
ADJUSTED R-SQ	31	.33587	.58926	.46527	.07714

STABLE STOCKS	CASES	MINIMUM	MAXIMUM	MEAN	STD DEV
INTERCEPT	25	-1.1050	.77000	.01468	.39235
ABS. T-STAT(INTCP)	25	.03100	1.6520	.61204	.42991
MARKET BETA	25	.62000	1.4590	.84420	.18418
ABS. T-STAT(MARKET)	25	7.3990	13.990	10.139	1.8011
SEC GROUP BETA	25	.37100	1.4610	.99992	.33794
ABS. T-STAT(GROUP)	25	2.2720	10.300	6.2773	2.2444
ADJUSTED R-SQ	25	.24800	.56474	.42304	.09202

TABLE 3 (continued)

CYCLICAL STOCK	CASES	MINIMUM	MAXIMUM	MEAN	STD DEV
INTERCEPT	32	-.53900	1.0050	.11984	.36150
ABS. T-STAT(INTCP)	32	.07800	1.5390	.60866	.38393
MARKET BETA	32	.58200	1.4130	1.1013	.20471
ABS. T-STAT(MARKET)	32	7.2580	15.580	11.125	2.1218
SEC GROUP BETA	32	.45600	1.5920	.99966	.33011
ABS. T-STAT(GROUP)	32	2.5360	9.7290	5.3292	1.6530
ADJUSTED R-SQ	32	.25209	.60152	.43594	.08931

ENERGY STOCKS	CASES	MINIMUM	MAXIMUM	MEAN	STD DEV
INTERCEPT	12	.13400	1.1150	.65617	.27435
ABS. T-STAT(INTCP)	12	.45700	3.8780	1.9626	.85619
MARKET BETA	12	.72500	1.1100	.93825	.10550
ABS. T-STAT(MARKET)	12	10.688	15.397	12.918	1.6861
SEC GROUP BETA	12	.72500	1.1770	1.0027	.13947
ABS. T-STAT(GROUP)	12	9.2710	16.679	12.316	2.0517
ADJUSTED R-SQ	12	.50650	.71085	.61285	.06514

Table 3(continued)

PANEL C FIVE-INDEX MODEL

GROWTH STOCKS	CASES	MINIMUM	MAXIMUM	MEAN	STD DEV
INTERCEPT	31	-1.0080	1.0170	.15648	.47833
T-STAT(INTCP)	31	-1.2980	2.2780	.41552	.97568
ABS. T-STAT(INTCP)	31	.06300	2.2780	.85655	.61011
MARKET BETA	31	.78300	1.8080	1.2348	.23496
T-STAT(MARKET)	31	8.8590	15.719	11.882	1.7906
ABS. T-STAT(MARKET)	31	8.8590	15.719	11.882	1.7906
GROWTH BETA	31	.21800	1.9390	1.0002	.42332
T-STAT(GROWTH)	31	1.8350	7.7620	4.4783	1.5715
ABS. T-STAT(GROWTH)	31	1.8350	7.7620	4.4783	1.5715
STABLE BETA	31	-.67800	1.1370	-.00003	.41711
T-STAT(STABLE)	31	-3.5480	3.0390	-.13981	1.8272
ABS. T-STAT(STABLE)	31	.13600	3.5480	1.4865	1.0370
CYCLIC BETA	31	-.73300	1.1280	.00013	.47162
T-STAT(CYCLIC)	31	-5.8960	3.7500	-.36010	2.3676
ABS. T-STAT(CYCLIC)	31	.02600	5.8960	1.9035	1.4126
ENERGY BETA	31	-.47500	.61400	.00003	.22842
T-STAT(ENERGY)	31	-4.1620	2.1930	-.19119	1.4498
ABS. T-STAT(ENERGY)	31	.05500	4.1620	1.1008	.94213
ADJUSTED R-SQ	31	.35458	.61677	.49189	.07644

Table 3 (continued)

STABLE STOCKS	CASES	MINIMUM	MAXIMUM	MEAN	STD DEV
INTERCEPT	25	-.55500	.61100	.03060	.27882
T-STAT(INTCP)	25	-1.7470	1.5990	.06776	.77596
ABS. T-STAT(INTCP)	25	.03100	1.7470	.62688	.44446
MARKET BETA	25	.62000	1.4590	.84444	.18435
T-STAT(MARKET)	25	7.4550	14.414	10.364	1.9379
ABS. T-STAT(MARKET)	25	7.4550	14.414	10.364	1.9379
GROWTH BETA	25	-.47800	.44900	-.00044	.26210
T-STAT(GROWTH)	25	-2.6290	3.3260	.03764	1.5622
ABS. T-STAT(GROWTH)	25	.29500	3.3260	1.3789	.67930
STABLE BETA	25	.29300	1.6140	.99952	.38458
T-STAT(STABLE)	25	1.6800	10.165	5.5983	2.2989
ABS. T-STAT(STABLE)	25	1.6800	10.165	5.5983	2.2989
CYCLIC BETA	25	-.71400	.42500	.00024	.26371
T-STAT(CYCLIC)	25	-4.4330	2.0630	-.06292	1.6449
ABS. T-STAT(CYCLIC)	25	.38800	4.4330	1.3075	.96390
ENERGY BETA	25	-.34000	.31000	.00088	.18163
T-STAT(ENERGY)	25	-3.0080	2.3250	.03568	1.4450
ABS. T-STAT(ENERGY)	25	.04800	3.0080	1.1687	.81648
ADJUSTED R-SQ	25	.26793	.59576	.45119	.09261

Table 3 (continued)

CYCLICAL STOCKS	CASES	MINIMUM	MAXIMUM	MEAN	STD DEV
INTERCEPT	32	-.53900	1.0540	.12141	.36573
T-STAT(INTCP)	32	-1.1430	1.5660	.20794	.70190
ABS. T-STAT(INTCP)	32	.07200	1.5660	.61325	.38612
MARKET BETA	32	.58200	1.4130	1.1019	.20452
T-STAT(MARKET)	32	7.4720	16.138	11.238	2.1534
ABS. T-STAT(MARKET)	32	7.4720	16.138	11.238	2.1534
GROWTH BETA	32	-.53500	.65200	-.00084	.23214
T-STAT(GROWTH)	32	-2.4460	2.4460	-.02218	1.0362
ABS. T-STAT(GROWTH)	32	.02900	2.4460	.79981	.64335
STABLE BETA	32	-.84400	.77400	-.00303	.36122
T-STAT(STABLE)	32	-3.2130	3.5150	.05925	1.6655
ABS. T-STAT(STABLE)	32	.02700	3.5150	1.2766	1.0466
CYCLIC BETA	32	.45900	1.6740	.99847	.35146
T-STAT(CYCLIC)	32	2.3330	9.2220	4.9735	1.6468
ABS. T-STAT(CYCLIC)	32	2.3330	9.2220	4.9735	1.6468
ENERGY BETA	32	-.86500	.32300	-.02391	.22407
T-STAT(ENERGY)	32	-2.1230	1.6520	-.01747	1.0297
ABS. T-STAT(ENERGY)	32	.02500	2.1230	.84241	.57277
ADJUSTED R-SQ	32	.26213	.63254	.45240	.08746

Table 3 (continued)

ENERGY STOCKS	CASES	MINIMUM	MAXIMUM	MEAN	STD DEV
INTERCEPT	12	.13400	1.1150	.65617	.27435
T-STAT(INTCP)	12	.45700	3.8900	1.9645	.85905
ABS. T-STAT(INTCP)	12	.45700	3.8900	1.9645	.85905
MARKET BETA	12	.72500	1.1100	.93825	.10550
T-STAT(MARKET)	12	10.684	15.375	12.925	1.6828
ABS. T-STAT(MARKET)	12	10.684	15.375	12.925	1.6828
GROWTH BETA	12	-.29700	.23400	-.00008	.15130
T-STAT(GROWTH)	12	-1.7330	1.4270	-.04625	.95989
ABS. T-STAT(GROWTH)	12	.04500	1.7330	.77558	.51721
STABLE BETA	12	-.26800	.37600	.00008	.17156
T-STAT(STABLE)	12	-1.9350	2.3850	.01492	1.1137
ABS. T-STAT(STABLE)	12	.00900	2.3850	.77192	.76852
CYCLIC BETA	12	-.36000	.25400	.00008	.19826
T-STAT(CYCLIC)	12	-2.1430	1.5990	-.06983	1.2849
ABS. T-STAT(CYCLIC)	12	.37500	2.1430	1.1335	.50456
ENERGY BETA	12	.68000	1.2670	1.0000	.16335
T-STAT(ENERGY)	12	6.6140	10.651	8.6199	1.3769
ABS. T-STAT(ENERGY)	12	6.6140	10.651	8.6199	1.3769
ADJUSTED R-SQ	12	.57281	.73109	.62400	.06011

VII. Appendices

Appendix A

REGRESSION PARAMETERS ESTIMATES FROM THE SINGLE-INDEX MODEL

COMPANY NAME	INTE-RCEPT	MARKET BETA	ADJ. R-SQ
PANEL A GROWTH STOCKS			
PrkElmer	.700	1.556	.484
	1.305	13.230*	
Burrough	.654	1.064	.311
	1.239	9.191*	
AMP	.760	1.155	.420
	1.676	11.620*	
Trane	-.137	1.138	.289
	-.230	8.721*	
ITT	-.221	1.300	.539
	-.552	14.780*	
MMM	.056	.991	.460
	.156	12.610*	
Zenith	-.520	1.443	.403
	-.887	11.230*	
Motorola	.403	1.368	.346
	.642	9.940*	
Polariod	-.419	1.608	.383
	-.616	10.770*	
TxInstmt	.468	1.236	.396
	.920	11.080*	

(t-statistic beneath each estimated coefficient)
(* indicates parameter is significant at 5% level)

Appendix A(continued)

COMPANY NAME	INTERCEPT	MARKET BETA	ADJ. R-SQ
NCR	.098	1.261	.357
	.174	10.180*	
Corning	-.483	1.171	.389
	-.987	10.910*	
IBM	.192	.871	.473
	.627	12.950*	
EsmKodak	.115	.897	.391
	.308	10.960*	
Pan Am	-1.008	1.808	.334
	-1.183	9.682*	
UAL	-.510	1.566	.321
	-.671	9.397*	
UniTech	.520	1.114	.299
	.913	8.921*	
TRW	.559	1.239	.409
	1.125	11.370*	
Honeywll	-.087	1.535	.418
	-.144	11.580*	
Merck	.465	.783	.299
	1.162	8.930*	
HewPackt	.986	1.242	.397
	1.930	11.090*	
Ampex	.167	1.556	.269
	.195	8.304*	
BaxterLb	1.017	1.123	.346
	1.972*	9.941*	
Xerox	-.110	1.101	.377
	-.233	10.640*	
Harcourt	-.345	1.263	.325
	-.568	9.489*	

Appendix A (continued)

COMPANY NAME	INTERCEPT	MARKET BETA	ADJ. R-SQ
MryldCup	-.048	1.301	.372
	-.085	10.400*	
BcDicksn	.370	1.097	.364
	.751	10.220*	
IntFlvFg	.357	1.081	.349
	.714	9.902*	
Avon	.021	.985	.279
	.039	8.414*	
ChbPonds	.137	1.224	.463
	.312	12.690*	
Nalco	.610	1.198	.379
	1.193	10.690*	
PANEL B STABLE STOCKS			
VignElec	-.410	.807	.283
	-.956	8.582*	
AmElecPw	-.217	.709	.291
	-.588	8.755*	
Ctr SW	-.145	.745	.240
	-.329	7.687*	
Flrd Pwr	-.080	.758	.236
	-.175	7.605*	
ColmbGas	.384	.620	.248
	1.066	7.863*	
PrctGamb	.210	.690	.348
	.666	9.981*	
GenFoods	-.158	.848	.330
	-.393	9.605*	
CocaCola	.093	.935	.445
	.266	12.230*	
Transam	-.204	1.459	.466
	-.392	12.780*	

Appendix A (continued)

COMPANY NAME	INTERCEPT	MARKET BETA	ADJ. R-SQ
HFC	-.162	1.170	.400
	-.338	11.170*	
CPC Intl	.134	.757	.344
	.385	9.900*	
Gillette	-.136	.941	.316
	-.293	9.297*	
QuakOats	.297	.936	.257
	.558	8.041*	
Campbell	-1.105	.669	.234
	-.027	7.558*	
Kellogg	.318	.685	.216
	.731	7.173*	
Hershey	-.093	.730	.215
	-.200	7.153*	
Reynolds	.611	.653	.237
	1.561	7.614*	
AmHmPrd	.317	.820	.327
	.808	9.523*	
Sears	-.555	.852	.389
	-1.558	10.906*	
Fed Dept	-.311	1.017	.368
	-.700	10.424*	
CIT	.330	.986	.326
	.695	9.247*	
Kraftco	.046	.772	.327
	.126	9.450*	
Nabisco	.069	.751	.255
	.162	7.984*	
ChaseMht	.085	.916	.302
	.183	8.981*	

Appendix A (continued)

COMPANY NAME	INTERCEPT	MARKET BETA	ADJ. R-SQ
NWBankCo	.313	.970	.365
	.731	10.340*	
PANEL C	CYCLICAL STOCKS		
AmSmltRf	.476	1.413	.314
	.683	9.253*	
ClarkEqp	-.044	1.348	.433
	-.086	11.946*	
IntHvstr	-.093	.907	.280
	-.191	8.528*	
Joy Mfg	.751	1.217	.275
	1.141	8.430*	
IntPaper	-.074	1.191	.509
	-.190	13.925*	
Alcoa	.102	.907	.266
	.203	8.222*	
Eaton YT	.178	1.199	.438
	.392	12.062*	
BgWarner	.213	1.104	.458
	.531	12.560*	
NL Inds	.259	1.280	.481
	.585	13.176*	
Beth Stl	-.187	1.117	.391
	-.402	10.947*	
NtlSteel	-.231	.763	.287
	-.577	8.679*	
RohmHaas	-.445	1.202	.363
	-.839	10.332*	
JohnManv	-.119	1.002	.350
	-.262	10.040*	
IngsRand	.146	1.131	.425
	.332	11.761*	

Appendix A (continued)

COMPANY NAME	INTE-RCEPT	MARKET BETA	ADJ. R-SQ
Goodyear	-.306	.962	.395
	-.769	11.038*	
GeorPacf	.153	1.281	.470
	.337	12.874*	
Caterplr	.116	1.106	.484
	.304	13.245*	
Timken	.183	.903	.413
	.509	11.466*	
Sunbeam	-.539	1.399	.480
	-1.110	13.129*	
Deere	.700	.992	.282
	1.325	8.563*	
Am Can	.041	.582	.255
	.124	8.000*	
ContlCan	.347	.685	.263
	.904	8.160*	
CinnMill	1.005	1.360	.293
	1.426	8.800*	
Square D	.069	1.119	.381
	.146	10.730*	
Am Std	.615	1.248	.313
	.996	9.220*	
Monsanto	-.238	1.113	.412
	-.536	11.446*	
Burlgton	-.286	1.030	.321
	-.573	9.408*	
Mohasco	-.267	1.283	.330
	-.437	9.588*	
Kenncott	.032	.916	.200
	.053	6.813*	

Appendix A (continued)

COMPANY NAME	INTE-RCEPT	MARKET BETA	ADJ. R-SQ
Weyerhsr	.308	1.102	.398
	.677	11.079*	
ConFrgwy	.398	1.355	.336
	.625	9.710*	
Pullman	.560	1.033	.243
	.919	7.676*	
Std Cal	.614	.969	.359
	1.422	10.230*	
PANEL D ENERGY STOCKS			
Texaco	.134	.987	.422
	.347	11.684*	
Exxon	.489	.725	.380
	1.585	10.716*	
Mobil	.772	.906	.318
	1.745	9.345*	
Std Ind	1.115	.775	.245
	2.461*	7.800*	
Gulf	.295	.961	.389
	.732	10.900*	
Union	.770	.978	.316
	1.603	9.287*	
Shell	.651	1.110	.362
	1.322	10.290*	
Conoco	.699	.937	.290
	1.429	8.742*	
ARichFd	1.044	.944	.268
	2.008*	8.280*	
Phillips	.699	1.055	.305
	1.315	9.053*	
Sun Oil	.592	.912	.296
	1.262	8.863*	

Appendix B

REGRESSION PARAMETERS ESTIMATES FROM THE TWO-INDEX MODEL

COMPANY NAME	INTE-RCEPT	MARKET BETA	GROUP BETA	ADJ. R-SQ
PANEL A GROWTH STOCKS				
PrkElmer	.700	1.556	1.179	.584
	1.466	14.870*	7.069*	
Burrough	.654	1.064	1.358	.500
	1.465	10.870*	8.703*	
AMP	.760	1.155	1.201	.589
	2.010*	13.930*	9.093*	
Trane	-.137	1.138	.912	.348
	-.242	9.182*	4.612*	
ITT	-.221	1.300	.561	.569
	-.575	15.410*	4.171*	
MMM	.056	.991	.565	.509
	.165	13.320*	4.766*	
Zenith	-.520	1.443	1.165	.495
	-.972	12.320*	6.236*	
Motorola	.403	1.368	1.339	.465
	.715	11.070*	6.804*	
Polariod	-.419	1.608	1.643	.530
	-.712	12.450*	7.980*	
TxInstmt	.468	1.236	1.240	.543
	1.066	12.840*	8.082*	

(t-statistic beneath each estimated coefficient)
(* indicates parameter is significant at 5% level)

Appendix B (continued)

COMPANY NAME	INTE-RCEPT	MARKET BETA	GROUP BETA	ADJ. R-SQ
NCR	.098	1.261	1.233	.480
	.195	11.410*	7.003*	
Corning	-.483	1.171	1.195	.539
	-1.145	12.660*	8.108*	
IBM	.192	.871	.535	.533
	.671	13.880*	5.347*	
EsmKodak	.115	.897	.712	.477
	.335	11.920*	5.935*	
Pan Am	-1.008	1.808	1.514	.414
	-1.271	10.400*	5.462*	
UAL	-.510	1.566	1.412	.410
	-.726	10.170*	5.755*	
UniTech	.520	1.114	.821	.348
	.955	9.332*	4.315*	
TRW	.559	1.239	.444	.417
	1.142	11.540*	2.597*	
Honeywll	-.087	1.535	1.125	.495
	-.156	12.540*	5.763*	
Merck	.465	.783	.599	.354
	1.220	9.377*	4.495*	
HewPackt	.986	1.242	1.215	.537
	2.219*	12.760*	7.829*	
Ampex	.167	1.556	1.354	.336
	.206	8.777*	4.789*	
BaxterLb	1.017	1.123	1.036	.449
	2.168*	10.920*	6.321*	
Xerox	-.110	1.101	1.323	.582
	-.287	13.100*	9.868*	
Harcourt	-.345	1.263	.705	.351
	-.584	9.756*	3.415*	

Appendix B(continued)

COMPANY NAME	INTE-RCEPT	MARKET BETA	GROUP BETA	ADJ. R-SQ
MryldCup	-.034	1.302	.545	.384
	-.061	10.600*	2.784*	
BcDicksn	.390	1.099	.784	.425
	.840	10.850*	4.858*	
IntFlvFg	.381	1.083	.882	.428
	.817	10.670*	5.452*	
Avon	.053	.988	1.201	.430
	.111	9.567*	7.297*	
ChbPonds	.137	1.224	.624	.499
	.326	13.260*	4.236*	
Nalco	.610	1.198	.586	.402
	1.225	10.980*	3.371*	
PANEL B STABLE STOCKS				
VignElec	-.410	.807	1.439	.517
	-1.174	10.530*	9.797*	
AmElecPw	-.217	.709	1.203	.508
	-.711	10.590*	9.367*	
Ctr SW	-.145	.745	1.271	.418
	-.378	8.851*	7.869*	
Flrd Pwr	-.080	.758	1.404	.445
	-.207	8.992*	8.682*	
ColmbGas	.384	.620	.686	.316
	1.127	8.312*	4.792*	
PrctGamb	.210	.690	.497	.384
	.691	10.350*	3.887*	
GenFoods	-.158	.848	1.397	.565
	-.491	12.000*	10.300*	
CocaCola	.093	.935*	.752	.513
	.286	13.160	5.515*	
Transam	-.204	1.459	1.237	.547
	-.429	13.990*	6.183*	

Appendix B (continued)

COMPANY NAME	INTE-RCEPT	MARKET BETA	GROUP BETA	ADJ. R-SQ
HFC	-.162	1.170	1.461	.561
	-.398	13.160*	8.568*	
CPC Intl	.134	.757	.668	.404
	.408	10.470*	4.810*	
Gillette	-.136	.941	.675	.346
	-.303	9.587*	3.585*	
QuakOats	.297	.936	1.309	.380
	.616	8.876*	6.469*	
Campbell	-1.105	.669	1.069	.383
	-.031	8.491*	7.073*	
Kellogg	.318	.685	.915	.306
	.783	7.686*	5.357*	
Hershey	-.093	.730	.711	.254
	-.207	7.399*	3.754*	
Reynolds	.611	.653	.427	.248
	1.586	7.734*	2.636*	
AmHmPrd	.317	.820	.371	.331
	.817	9.629*	2.272*	
Sears	-.555	.852	.699	.448
	-1.652	11.560*	4.942*	
Fed Dept	-.311	1.017	1.271	.514
	-.804	11.970*	7.807*	
CIT	.353	.934	.972	.384
	.782	9.173*	4.552*	
Kraftco	.045	.737	.990	.443
	.134	9.978*	6.546*	
Nabisco	.770	.749	1.277	.445
	.209	9.307*	8.300*	
ChaseMht	.091	.915	1.064	.401
	.213	9.758*	5.938*	

Appendix B (continued)

COMPANY NAME	INTE-RCEPT	MARKET BETA	GROUP BETA	ADJ. R-SQ
NWBankCo	.320	.969	1.233	.516
	.864	11.910*	7.932*	
PANEL C	CYCLICAL STOCKS			
AmSmltRf	.476	1.413	1.373	.385
	.727	9.848*	5.083*	
ClarkEqp	-.044	1.348	1.418	.559
	-.099	13.650*	7.627*	
IntHvstr	-.093	.907	.968	.356
	-.203	9.092*	5.153*	
Joy Mfg	.751	1.217	1.532	.385
	1.248	9.227*	6.167*	
IntPaper	-.074	1.191	.998	.602
	-.213	15.580*	6.935*	
Alcoa	.102	.907	1.397	.431
	.232	9.418*	7.704*	
Eaton YT	.178	1.199	1.166	.544
	.439	13.510*	6.979*	
BgWarner	.213	1.104	.592	.484
	.548	12.970*	3.696*	
NL Inds	.259	1.280	.786	.523
	.614	13.840*	4.512*	
Beth Stl	-.187	1.117	1.526	.587
	-.492	13.410*	9.729*	
NtlSteel	-.231	.763	1.169	.466
	-.672	10.100*	8.219*	
RohmHaas	-.445	1.202	.999	.422
	-.888	10.930*	4.823*	
JohnManv	-.119	1.002	.813	.402
	-.275	10.550*	4.550*	
IngsRand	.146	1.131	.827	.478
	.351	12.440*	4.831*	

Appendix B (continued)

COMPANY NAME	INTE-RCEPT	MARKET BETA	GROUP BETA	ADJ. R-SQ
Goodyear	-.306	.962	.684	.439
	-.805	11.560*	4.367*	
GeorPacf	.153	1.281	.967	.535
	.363	13.860*	5.560*	
Caterplr	.116	1.106	.561	.509
	.314	13.680*	3.684*	
Timken	.183	.903	.847	.504
	.558	12.580*	6.265*	
Sunbeam	-.539	1.399	.645	.497
	-1.139	13.470*	3.298*	
Deere	.700	.992	.552	.291
	1.344	8.690*	2.566*	
Am Can	.041	.582	.456	.284
	.127	8.226*	3.426*	
ContlCan	.347	.685	.824	.356
	.975	8.801*	5.618*	
CinnMill	1.005	1.360	1.520	.383
	1.539	9.497*	5.639*	
Square D	.070	1.119	.941	.445
	.155	11.420*	5.102*	
Am Std	.615	1.248	1.592	.444
	1.116	10.330*	7.005*	
Monsanto	-.238	1.113	.890	.475
	-.572	12.210*	5.183*	
Burlgton	-.286	1.030	1.030	.399
	-.614	10.080*	5.354*	
Mohasco	-.267	1.283	.823	.354
	-.448	9.847*	3.353*	
Kenncott	.045	.918	1.197	.281
	.078	7.258*	5.021*	

Appendix B(continued)

COMPANY NAME	INTE-RCEPT	MARKET BETA	GROUP BETA	ADJ. R-SQ
Weyerhsr	.317	1.103	.832	.449
	.735	11.690*	4.675*	
ConFrgwy	.413	1.357	1.422	.429
	.704	10.560*	5.873*	
Pullman	.534	1.021	.642	.252
	.890	7.687*	2.536*	
PANEL D ENERGY STOCKS				
Std Cal	.614	.969	1.097	.711
	2.133	15.351*	15.332*	
Texaco	.134	.987	.857	.662
	.457	15.397*	11.778*	
Exxon	.489	.725	.725	.673
	2.199	14.863*	13.181*	
Mobil	.772	.906	.993	.616
	2.342	12.543*	12.283*	
Std Ind	1.115	.775	1.177	.691
	3.878	12.289*	16.679*	
Gulf	.295	.961	.869	.634
	.955	14.217*	11.493*	
Union	.770	.978	1.042	.593
	2.097	12.148*	11.574*	
Shell	.651	1.110	1.053	.613
	1.713	13.329*	11.302*	
Conoco	.699	.937	1.126	.538
	1.959	11.985*	12.863*	
ARichFd	1.044	.944	1.152	.582
	2.668	11.000*	11.999*	
Phillips	.699	1.055	1.057	.534
	1.628	11.210*	10.034*	
Sun Oil	.592	.912	.885	.506
	1.522	10.688*	9.271*	

Appendix C

REGRESSION PARAMETERS ESTIMATES FROM THE FIVE-INDEX MODEL

COMPANY NAME	INTE-RCEPT	MARKET BETA	GROWTH BETA	STABLE BETA	CYCLIC BETA	ENERGY BETA	ADJ. R-SQ
PANEL A	GROWTH STOCKS						
PrkElmer	.700	1.556	1.162	-.113	-.048	-.009	.583
	1.456	14.764*	5.312*	-.488	-.226	-.055	
Burrough	.654	1.064	1.211	-.678	-.337	-.108	.532
	1.507	11.183*	6.136*	-3.239*	-1.743	-.713	
AMP	.760	1.155	1.330	-.025	-.126	.177	.597
	2.018*	13.988*	7.762*	-.136	-.752	1.349	
Trane	-.137	1.138	.980	.293	.845	.021	.394
	-.250	9.470*	3.931*	1.110	3.458*	.108	
ITT	-.221	1.300	.757	.549	.281	.189	.590
	-.587	15.719*	4.410*	3.015*	1.670	1.437	
MMM	.056	.991	.464	-.120	-.513	-.097	.537
	.169	13.664*	3.081*	-.753	-3.484*	-.839	
Zenith	-.520	1.443	1.133	-.179	.780	-.061	.531
	-1.003	12.714*	4.807*	-.717	3.382*	-.338	
Motorola	.403	1.368	1.458	-.635	.247	.208	.497
	.734	11.369*	5.838*	-2.399*	1.009	1.086	
Polariod	-.419	1.608	1.556	-.064	-.277	-.096	.531
	-.708	12.389*	5.776*	-.224	-1.049	-.462	
TxInstmt	.468	1.236	1.329	-.577	.242	.164	.580
	1.105	13.319*	6.900*	-2.825*	1.282	1.108	

(t-statistic beneath each estimated coefficient)
(* indicates parameter is significant at 5% level)

Appendix C(continued)

COMPANY NAME	INTE-RCEPT	MARKET BETA	GROWTH BETA	STABLE BETA	CYCLIC BETA	ENERGY BETA	ADJ. R-SQ
NCR	.098	1.261	1.283	-.317	.437	.077	.497
	.197	11.545*	5.662*	-1.321	1.968*	.444	
Corning	-.483	1.171	1.111	-.278	.069	-.087	.542
	-1.143	12.644*	5.779*	-1.363	.367	-.586	
IBM	.192	.871	.218	-.446	-.685	-.340	.617
	.737	15.235*	1.835	-3.548*	-5.896*	-3.736*	
EsmKodak	.115	.897	.315	-.229	-.520	-.475	.532
	.352	12.534*	2.124*	-1.455	-3.578*	-4.162*	
Pan Am	-1.008	1.808	1.939	1.137	.631	.415	.443
	-1.298	10.621*	5.489*	3.039*	1.825	1.531	
UAL	-.510	1.566	1.405	.191	1.128	-.083	.461
	-.755	10.581*	4.574*	.587	3.750*	-.353	
UniTech	.520	1.114	.996	-.460	.272	.265	.381
	.975	9.519*	4.104*	-1.788	1.146	1.419	
TRW	.559	1.239	.583	.061	.114	.171	.417
	1.137	11.485*	2.603*	.256	.521	.993	
Honeywll	-.087	1.535	.810	-.166	-.036	-.397	.505
	-.157	12.603*	3.203*	-.618	-.147	-2.043*	
Merck	.465	.783	.445	.074	-.733	-.175	.422
	1.283	9.858*	2.701*	.422	-4.541*	-1.379	
HewPackt	.986	1.242	1.254	-.488	-.260	.113	.565
	2.278*	13.095*	6.369*	-2.338*	-1.351	.745	
Ampex	.167	1.556	1.826	.079	.009	.614	.355
	.208	8.859*	5.010*	.205	.026	2.193*	
BaxterLb	1.017	1.123	.972	.422	-.355	-.110	.475
	2.207*	11.122*	4.637*	1.902	-1.729	-.686	
Xerox	-.110	1.101	1.143	-.311	-.216	-.195	.589
	-.288	13.134*	6.568*	-1.689	-1.270	-1.462	
Harcourt	-.345	1.263	.826	.403	.259	.106	.357
	-.584	9.748*	3.071*	1.412	.983	.515	

Appendix C(continued)

COMPANY NAME	INTE-RCEPT	MARKET BETA	GROWTH BETA	STABLE BETA	CYCLIC BETA	ENERGY BETA	ADJ. R-SQ
MryldCup	-.035	1.304	.653	.084	.486	.109	.394
	-.063	10.643*	2.560*	.313	1.960*	.560	
BcDicksn	.383	1.098	.547	-.067	-.397	-.283	.439
	.830	10.928*	2.613*	-.307	-1.951	-1.764	
IntFlvFg	.383	1.080	.949	.496	-.277	.053	.452
	.835	10.810*	4.559*	2.267*	-1.369	.333	
Avon	.053	.985	1.143	.388	-.598	-.083	.470
	.115	9.838*	5.487*	1.769	-2.948*	-.520	
ChbPonds	.137	1.224	.544	.505	-.545	-.130	.551
	.343	13.922*	2.981*	2.609*	-3.051*	-.928	
Nalco	.610	1.198	.664	.470	.127	.048	.414
	1.231	11.031*	2.944*	1.968*	.575	.278	
PANEL B	STABLE STOCKS						
VignElec	-.410	.807	-.190	1.497	-.085	.144	.537
	-1.193	10.706*	-1.215	9.034*	-.557	1.201	
AmElecPw	-.217	.709	-.192	1.274	.064	.162	.536
	-.728	10.849*	-1.416	8.862*	.485	1.552	
Ctr SW	-.145	.745	-.162	1.381	-.378	.241	.475
	-.397	9.274*	-.970	7.813*	-2.316*	1.879	
Flrd Pwr	-.080	.758	.301	1.614	.117	.310	.458
	-.209	9.054*	1.731	8.769*	.686	2.325*	
ColmbGas	.384	.620	-.150	.808	-.117	.250	.371
	1.168	8.617*	-1.003	5.103*	-.798	2.181*	
PrctGamb	.210	.690	.196	.499	-.302	-.023	.413
	.704	10.553*	1.447	3.475*	-2.272*	-.221	
GenFoods	-.158	.848	.196	1.564	.292	.247	.578
	-.496	12.126*	1.350	10.165*	2.056*	2.219*	
CocaCola	.093	.935	.449	.719	-.394	-.133	.596
	.312	14.380*	3.326*	5.024*	-2.977*	-1.280	
Transam	-.204	1.459	-.360	1.015	.425	-.340	.578
	-.442	14.414*	-1.713	4.557*	2.063*	-2.105*	

Appendix C (continued)

COMPANY NAME	INTE-RCEPT	MARKET BETA	GROWTH BETA	STABLE BETA	CYCLIC BETA	ENERGY BETA	ADJ. R-SQ
HFC	-.162	1.170	.055	1.440	.080	-.050	.561
	-.396	13.087*	.295	7.327*	.439	-.353	
CPC Intl	.134	.757	-.216	.665	.292	.027	.429
	.414	10.642*	-1.464	4.249*	2.017*	.240	
Gillette	-.136	.941	.337	.680	-.158	-.052	.366
	-.306	9.684*	1.672	3.182*	-.800	-.335	
QuakOats	.297	.936	-.137	1.239	-.178	-.091	.380
	.613	8.825*	-.623	5.309*	-.827	-.540	
Campbell	-.011	.669	-.158	.938	.147	-.207	.398
	-.031	8.549*	-.972	5.451*	.923	-1.659	
Kellogg	.318	.685	-.478	.810	.100	-.097	.337
	.797	7.820*	-2.629*	4.207*	.564	-.695	
Hershey	-.093	.730	.367	.769	.201	.022	.273
	-.209	7.455*	1.805	3.567*	1.007	.143	
Reynolds	.611	.653	-.357	.321	.122	-.124	.268
	1.599	7.796*	-2.050*	1.740	.719	-.926	
AmHmPrd	.317	.820	.275	.293	-.714	-.167	.426
	.878	10.344*	1.672	1.680	-4.433*	-1.321	
Sears	-.555	.852	.169	.526	-.145	-.334	.511
	-1.747	12.231*	1.167	3.434*	-1.022	-3.008*	
Fed Dept	-.311	1.017	.285	1.180	.129	-.224	.554
	-.835	12.444*	1.680	6.565*	.776	-1.720	
CIT	.346	.943	-.227	.952	.188	.053	.394
	.769	9.244*	-1.069	3.989*	.916	.340	
Kraftco	.040	.736	-.118	.987	.176	.006	.448
	.119	9.937*	-.778	5.802*	1.163	.048	
Nabisco	.079	.749	.260	1.359	-.120	.097	.454
	.215	9.325*	1.562	7.706*	-.740	.761	
ChaseMht	.096	.914	-.087	1.168	.328	.188	.418
	.226	9.835*	-.453	5.723*	1.743	1.266	

Appendix C(continued)

COMPANY NAME	INTE-RCEPT	MARKET BETA	GROWTH BETA	STABLE BETA	CYCLIC BETA	ENERGY BETA	ADJ. R-SQ
NWBankCo	.322	.968	-.069	1.290	-.064	.117	.521
	.869	11.912*	-.411	7.224*	-.388	.900	
PANEL C	CYCLICAL STOCKS						
AmSmltRf	.476	1.413	-.535	-.408	1.370	.075	.411
	.739	10.010*	-1.825	-1.313	4.776*	.335	
ClarkEqp	-.044	1.348	.155	.253	1.482	.122	.560
	-.098	13.595*	.754	1.161	7.356*	.769	
IntHvstr	-.093	.907	.047	-.215	.898	-.162	.362
	-.203	9.086*	.229	-.979	4.426*	-1.017	
Joy Mfg	.751	1.217	-.108	-.022	1.561	.082	.385
	1.241	9.174*	-.391	-.074	5.788*	.387	
IntPaper	-.074	1.191	-.174	-.521	.993	.034	.633
	-.220	16.138*	-1.136	-3.213*	6.623*	.290	
Alcoa	.102	.907	.147	-.359	1.486	.211	.456
	.236	9.580*	.746	-1.725	7.724*	1.399	
Eaton YT	.178	1.199	.158	.386	1.160	-.052	.561
	.445	13.686*	.866	2.000*	6.513*	-.374	
BgWarner	.213	1.104	-.079	.005	.486	-.242	.494
	.551	13.043*	-.452	.027	2.827*	-1.790	
NL Inds	.259	1.280	-.055	-.111	.877	.227	.537
	.621	13.988*	-.292	-.552	4.711*	1.555	
Beth Stl	-.187	1.117	-.029	-.010	1.568	.103	.588
	-.490	13.357*	-.169	-.057	9.222*	.769	
NtlSteel	-.231	.763	-.086	-.057	1.142	-.050	.464
	-.667	10.034*	-.544	-.340	7.388*	-.414	
RohmHaas	-.445	1.202	-.034	-.431	.859	-.307	.438
	-.895	11.023*	-.149	-1.796	3.875*	-1.768	
JohnManv	-.119	1.002	-.462	.501	.752	-.115	.457
	-.288	11.014*	-2.446*	2.507*	4.067*	-.791	
IngsRand	.146	1.131	-.201	-.337	.829	.044	.494
	.355	12.566*	-1.074	-1.703	4.529*	.308	

Appendix C(continued)

COMPANY NAME	INTE-RCEPT	MARKET BETA	GROWTH BETA	STABLE BETA	CYCLIC BETA	ENERGY BETA	ADJ. R-SQ
Goodyear	-.306	.962	-.058	.488	.645	-.111	.475
	-.828	11.888*	-.345	2.745*	3.920*	-.858	
GeorPacf	.153	1.281	.306	.695	1.073	.180	.564
	.373	14.241*	1.639	3.515*	5.867*	1.257	
Caterplr	.116	1.106	.158	-.138	.552	-.033	.514
	.314	13.679*	.941	-.777	3.358*	-.259	
Timken	.183	.903	.078	.026	.885	.081	.503
	.555	12.501*	.523	.161	6.028*	.699	
Sunbeam	-.539	1.399	.240	.145	.627	-.078	.506
	-1.143	13.517*	1.118	.639	2.981*	-.473	
Deere	.700	.992	-.042	-.110	.546	-.005	.288
	1.334	8.626*	-.177	-.435	2.333*	-.025	
Am Can	.041	.582	-.031	.398	.459	-.008	.315
	.130	8.364*	-.217	2.600*	3.249*	-.072	
ContlCan	.347	.685	-.047	.211	.856	.072	.361
	.974	8.788*	-.292	1.227	5.399*	.578	
CinnMill	1.054	1.360	.098	-.844	1.470	-.091	.411
	1.566	9.664*	.334	-2.727*	5.140*	-.405	
Square D	.069	1.119	-.302	.055	.788	-.328	.462
	.157	11.541*	-1.502	.258	4.001*	-2.123*	
Am Std	.615	1.248	.343	.774	1.674	.115	.472
	1.140	10.551*	1.398	2.976*	6.963*	.612	
Monsanto	-.238	1.113	-.175	-.366	.797	-.180	.482
	-.573	12.229*	-.925	-1.828	4.310*	-1.242	
Burlgton	-.286	1.030	.173	-.006	.922	-.276	.426
	-.625	10.259*	.828	-.027	4.520*	-1.726	
Mohasco	-.267	1.283	.652	.209	.888	.067	.380
	-.455	9.996*	2.446*	.742	3.404*	.329	
Kenncott	.041	.917	-.302	-.273	1.311	.323	.329
	.072	7.472*	-1.187	-1.013	5.253*	1.652	

Appendix C (continued)

COMPANY NAME	INTE-RCEPT	MARKET BETA	GROWTH BETA	STABLE BETA	CYCLIC BETA	ENERGY BETA	ADJ. R-SQ
Weyerhsr	.315	1.103	.057	-.032	.909	.179	.454
	.730	11.676*	.288	-.154	4.731*	1.191	
ConFrgwy	.414	1.357	.089	.231	1.395	-.865	.432
	.704	10.537*	.332	.815	5.329*	-.421	
Pullman	.541	1.040	-.008	-.234	.691	.223	.262
	.902	7.809*	-.029	-.764	2.540*	1.069	
PANEL D	ENERGY STOCKS						
Std Cal	.614	.969	-.006	-.039	-.200	1.043	.713
	2.131*	15.334*	-.045	-.283	-1.557	10.359*	
Texaco	.134	.987	-.119	.053	-.151	.788	.664
	.457	15.375*	-.893	.378	-1.158	7.702*	
Exxon	.489	.725	-.088	.027	-.080	.680	.674
	2.190*	14.805*	-.862	.247	-.808	8.710*	
Mobil	.772	.906	.212	.376	.055	1.152	.626
	2.362*	12.647*	1.427	2.385*	.375	10.090*	
Std Ind	1.115	.775	-.104	-.268	-.131	1.067	.696
	3.890*	12.328*	-.798	-1.935	-1.026	10.651*	
Gulf	.295	.961	.078	.218	.166	.965	.639
	.955	14.218*	.558	1.464	1.206	8.956*	
Union	.770	.978	.110	-.190	.112	1.063	.598
	2.096*	12.145*	.656	-1.075	.682	8.288*	
Shell	.651	1.110	-.297	-.094	-.360	.870	.624
	1.727	13.441*	-1.733	-.517	-2.143*	6.614*	
Conoco	.699	.937	-.097	-.039	.254	1.120	.622
	1.963*	12.009*	-.600	-.225	1.599	9.000*	
ARichFd	1.044	.944	.234	.002	.184	1.267	.582
	2.665*	10.988*	1.315	.009	1.055	9.257*	
Phillips	.699	1.055	.020	.050	-.102	1.059	.538
	1.617	11.132*	.103	.238	-.528	7.008*	
Sun Oil	.592	.912	.056	-.095	.254	.926	.513
	1.521	10.684*	.317	-.507	1.465	6.804*	

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