INDUSTRY ROTATION IN THE U.S. STOCK MARKET : AN APPLICATION OF MULTIPERIOD PORTFOLIO THEORY

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Abstract

In this thesis we apply the simple reinvestment version of multiperiod portfolio theory to the construction and rebalancing of portfolios composed of the industry sectors of the U.S. stock market and a risk-free asset. In particular, we use this model to examine portfolio choices of investors with utility functions of the isoelastic class and with beliefs specified by a joint probability distribution of asset returns.

Previous studies of this type employed an investment universe composed of major U.S., as well as international, asset categories. With the exception of one study, a simple probability assessment approach was used to represent investors' beliefs. We present a natural extension of these works. First, we examine the efficacy of multiperiod portfolio theory in asset allocation at a more micro level. This is of interest since industry analyses, without the use of multiperiod portfolio theory, have long been employed by the investment community. Second, as in previous studies, we initially employ a simple probability assessment approach where the joint return distribution is estimated from past realized returns, but we extend this in several ways.

In order to examine the robustness of our results, we examine investment universes of eight, twelve and twenty-four equal- and value-weighted industry groupings of the U.S. stock market. The joint return distributions are estimated using realized returns of the most recent 28, 32 and 40 quarters with each vector of returns given an equal probability of occurrence in the next quarter. Then this approach is extended in several ways. First, we include "all of history" as our estimate of the return distribution. Second, we employ an inflation adapter to adjust the estimated return distribution. Third, we examine a "disaster states" scenario, and fourth, we alter the

probabilities of the joint return distribution giving more weight to the recent past.

The results show that the portfolio choices performed well in both the full 1934-86 period and in the 1966-86 sub-period, achieving both economically and statistically significant excess returns in several instances. For the most part, the portfolio returns were not statistically different: (1) when 28, 32, or 40 quarters of returns were employed as estimates of the joint return distribution, and (2) when eight, twelve, or twenty-four industry groupings were considered. Finally, the simple probability assessment approach has much to recommend it since it did as well as the other approaches in estimating the return distribution.

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I. Introduction

The management of investment portfolios has traditionally consisted of three major activities:[1] (1) asset allocation, (2) group rotation, and (3) security selection. The first stage, asset allocation, can be characterized as the apportioning of funds between major asset categories in an attempt to obtain higher returns at lower risk in the long run. For example, the fund manager can invest either domestically in common stocks, government bonds, corporate bonds and Treasury bills, or internationally in bond and equity markets of different countries, or some combination of both. An extension of asset allocation is the "pure market timing" strategy where funds are shifted from equities to a riskless asset and vice versa. In group rotation, securities with common characteristics are combined to form various major groupings of equities; for example, the various industry components of the U.S. stock market, or as in Farrell's (1974) classification of growth, cyclical, stable and energy stocks. As in asset allocation, opportunistic shifts between these groupings of securities are made with the objective of higher long run returns and lower risk. Finally, in the security selection stage, the fund manager chooses, from among the many securities that make up the major asset classes or groupings, those that have above average return to risk prospects.

In this thesis we focus on stage two of the investment process. In particular, we apply the multiperiod portfolio theory of Mossin (1968), Hakansson (1971c,1974), Leland (1972), Ross (1974) and Huberman and Ross (1983) to the construction and rebalancing of portfolios composed of the

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[1]For example, see Sharpe (1985).

industry sectors of the U.S. stock market and a risk-free asset. While there are studies examining the allocation of funds across major asset categories using the model drawn from multiperiod portfolio theory (see Grauer and Hakansson (1981,1982,1984,1985,1986,1987,1988)), there are none applying this model to industry/group rotation. Most studies in industry analysis have concerned themselves with the question of whether there are any benefits to be had from such analysis (see, for example, King (1966), Latané and Tuttle (1968), Brigham and Pappas (1969), Tysseland (1971), Meyers (1973), Reilly and Drzycimski (1974), and Livingston (1977)). Furthermore, while there have been studies reporting results for calculating optimal portfolios using expected utility approaches, they only did so at a point in time rather than over time. These studies include, for example, the pioneering work of Ziemba, Parkan and Brooks-Hill (1974), and later studies by Grauer (1981a,1981b)), and the studies referred to in footnote 2.

Perhaps the reason for the lack of literature on the application of multiperiod portfolio theory to the construction and rebalancing of portfolios for long run investment horizons is the computational requirements needed to effect such a study (even for a single time period). This has been noted in the literature (for example, in Grauer (1981a) and in Kroll, Levy and Markowitz (1984)), so that the emphasis seems to have been to develop and/or evaluate mean-variance approximations to the power utility functions used in multiperiod portfolio theory.[2]

However, in pathbreaking studies, Grauer and Hakansson (1982,1985,1986) applied multiperiod portfolio theory to explore active asset allocation among

[2]Studies here include Ziemba, Parkan and Brooks-Hill (1974), Levy and Markowitz (1979), Pulley (1981,1983), Kroll, Levy and Markowitz (1984), Kallberg and Ziemba (1983), and Grauer (1986).

U.S. stocks, corporate bonds, government bonds, and Treasury bills. Borrowing was ruled out in the first article while margin purchases were permitted in the other two. The third article also included small stocks as a separate investment vehicle. The major input required of this model is an estimate of next period's joint return distribution. As these papers were the pioneering studies in the area, Grauer-Hakansson employed a simple probability assessment approach to estimate the joint return distribution. That is, the estimate of the joint distribution is just the past realized returns of the assets being considered, with each joint realization given equal probability of occurring in the next period. Both annual and quarterly rebalancing were used and the results from these initial studies indicated that the gains from active portfolio management were substantial.

Grauer and Hakansson (1987) examined a universe composed of the four major U.S. asset categories and up to fourteen non-U.S. equity and bond categories. Again, the simple probability assessment approach was employed to estimate the joint return distribution. The results from this study indicated that the gains from having non-U.S. assets in the investment universe were especially large (some were statistically significant) and there was strong evidence of market segmentation in that the U.S. assets were (mostly) ignored in the presence of non-U.S. asset categories.

Moving slightly away from the simple probability assessment approach of their earlier studies, Grauer and Hakansson (1988) applied an inflation adapter to the raw joint empirical distribution approach to generating probability assessments and used it to choose portfolios of the value-weighted index of New York Stock Exchange stocks and a risk-free asset. This market timing approach, which is a variation of asset allocation, was particularly successful in the 1966-85 sub-period.

Thus, the Grauer-Hakansson studies have shown that applying multiperiod portfolio theory to asset allocation can be quite successful. There are indications from their conclusions that such active portfolio management can "beat the market". Given that the inputs were generated from historical data, the results call into question the weak-form of the efficient markets hypothesis which states that one cannot use past data to obtain superior investment performance.

As such, this thesis explores several questions. First, we examine whether multiperiod portfolio theory can be successfully applied beyond the asset allocation stage. We extend the work of Grauer-Hakansson to the next level, that of industry rotation, to see if the same general conclusions can be reached. If the approach can be extended, it adds to their evidence that suggests the market may not be weak-form efficient. It will be interesting to see whether industry analysis can be successfully employed in a structured portfolio selection model given its central role in traditional investment analysis. We focus on a base case. The Grauer-Hakansson studies mostly employed a 32 quarter estimating period for the joint return distribution. We follow their lead and establish this as our reference point; that is, we initially employ the most recent 32 quarters of joint realized returns, each with an equi-probable chance of occurring in the next quarter. Furthermore, we use a twelve industry investment universe, which follows an industry grouping procedure employed by Breeden, Gibbons and Litzenberger (1986), as our base case. Given this base case, we have structured the thesis to explore a second question: whether the results from the base case are data specific. Thus, we examine three sets of investment universes: an eight, twelve and twenty-four equal- and value-weighted industry universe. The success of the Grauer-Hakansson studies was based on a naive simple probability assessment approach to estimating next period's joint return distribution. The third major question we examine is the efficacy of this technique. We do so by experimenting with different ways of estimating the joint return distribution.

To be more specific, from the established reference point described above, we make logical extensions to examine the robustness of the simple probability assessment technique and the Grauer-Hakansson conclusions. First, we conduct industry rotation by expanding the investment universe from twelve industries (the base universe) to twenty-four and contracting it to eight.[3] Second, we examine the effects of using different amounts of realized returns to estimate the joint return distribution. We extend the estimation of the joint return distribution from the most recent 32 quarters (the base case) to the most recent 28 and 40 quarters, and lastly, we use all the historic returns available.[4] This latter approach is an "all-of-history" method as opposed to the simple probability assessment approach, which is a "moving window" method. Following these extensions to estimating the joint return distribution, we adopt the inflation adapter method from the Grauer-Hakansson "market timing" study as the next logical step. We apply this approach to our base case. These simple extensions and replication of the methods from the Grauer-Hakansson studies to industry rotation will explore the question of robustness of the model in general and of the estimating techniques in particular.

On a more innovative level, we make some changes to the simple probability assessment approach. We deviate from the equi-probable joint

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[3]In this analysis we employ the most recent 32 quarters of realized returns as the estimate of the joint return distribution.
[4]In this case we hold constant the base case twelve industry investment universe.

realization method to employ a simple "sum-of-the-digits" rule in assigning probabilities to the outcome for the next period. This is applied to our base case. Basically, this rule assigns the largest probability of occurrence in the upcoming period to the most recent joint realization, and assigns the smallest to the joint realization the furthest away. The motivation for using this exponential decay-type technique of assigning probabilities comes from univariate time series modelling. The appeal is that the most recent past should be a better guide to the next period than the more distant past. This contrasts with the simple probability assessment approach, which assigns equal probabilities to each outcome in the moving window.

Finally, we examine a "disaster state" scenario for the base case by appending the worst states for each industry to the estimate of the joint returns for the next period. These "disaster states" are assigned varying degrees of likelihood of occurrence. The motivation for this method is to keep the investor aware that such states may occur in any period, but at the same time to assign these states a probability so as not to drive the investor completely out of the equity markets.

Given the intent of the thesis, we examine the portfolio rates of return and portfolio compositions over time as a gauge of the success of the active strategies. We present tables of geometric mean rates of return and standard deviations of returns, and portfolio compositions over time, of the active strategies for this purpose.[5] To further judge the success of the active strategies, we employ several well known measures of investment performance. First, we evaluate the success of the strategies using several traditional

[5]This follows the Grauer-Hakansson studies.

academic measures of abnormal performance. With the CRSP value-weighted index as the benchmark market portfolio, we report the Jensen (1968) performance index,[6] and the Treynor-Mazuy (1966) and Henriksson-Merton (1981) tests of market timing ability. Second, we perform a paired *t*-test that compares the portfolio returns from the active strategies to three sets of benchmarks:[7] (i) the (completely) passive strategy of holding any one of the value-weighted industry indices; (ii) a passive strategy of holding the Center for Research in Security Prices (CRSP) value-weighted index with varying degrees of leverage; and, (iii) a set of "semi-passive" strategies which up- or down-lever an equal-weighted index of the equally weighted industry indices. Third, we compare the portfolio returns of the active strategies among themselves when different methods are used to estimate the joint return distribution. Again, the test for differences in portfolio returns is the paired t-statistic.

The results show that the portfolio choices performed well in both the full 1934-86 period and in the 1966-86 sub-period, achieving both economically and statistically significant excess returns in several instances. Thus, the success of multiperiod portfolio theory applied to major asset categories also appears to hold at a more micro level. We conclude that the simple empirical probability assessment approach is not without merit. This evidence of superior performance from the use of a naive technique reinforces the conclusions of the Grauer-Hakansson studies, and deals a damaging blow to the weak-form efficient markets hypothesis.

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[6] Also known as Jensen's alpha; it is the intercept from a characteristic line regression.

[7] These benchmarks and the reason for their use are described in more detail in Chapter V.

For the most part, the portfolio returns were not statistically different: (1) when 28, 32, or 40 quarters of equi-probable realized returns are employed as the empirical probability distribution, and (2) when eight, twelve, or twenty-four industry groupings are the investment universes. Moreover, the "all-of-history" method in estimating the joint return distribution showed statistical inferiority over the 32 quarter simple probability assessment approach, particularly for the more risk averse investors. This occurred in both the 1934-86 and 1966-86 periods, when equal-weighted industries were the universe, but only in the full period, when value-weighted industries were the universe.

Comparing returns from the twelve industry universe employing a 32 quarter simple probability assessment approach to the returns generated when various adjustments were made to the estimating distribution reveal the following results. (1) For the period 1966-86 with the value-weighted universe, none of the adjustments made any difference (statistically) to the portfolio returns. (2) For the 1934-86 and 1966-86 periods, regardless of leverage opportunities for both equal- and value-weighted industries, there is no statistical difference between the portfolio returns using the simple historical raw joint estimates as the joint return distribution versus the inflation adapter method to adjust the distribution. (3) Both the "all-of-history" and the "disaster states" scenario approaches to estimating the return distribution showed statistical inferiority to the simple historical raw estimate approach as well as to the inflation adapter method in the 1934-86 and 1966-86 periods, especially for the more risk averse investors. (4) The "sum-of-the-digits" approach to adjusting the probabilities, at least for the more risk averse investors, was found to be superior to all methods in the 1934-86 period while it made no difference in the 1966-86 sub-period. Again, these results serve to reinforce the conclusions of the Grauer-Hakansson studies, particularly on the efficacy of using just the simple empirical probability assessment approach to estimating the joint return distribution.

The evidence from the performance tests of the active strategies reveal that: (1) according to the Jensen performance index, there are mostly positive α's with some statistical significance at the 5% and 1% levels, indicating some positive abnormal performance, and, (2) positive market timing ability existed with respect to the Treynor-Mazuy and Henriksson-Merton performance measures for the period 1966-86, while the reverse is true for the 1934-86 period. However, most of the timing ability, positive or negative, disappeared when a statistical correction for heteroscedasticity was made.

The thesis proceeds as follows. Chapter II describes multiperiod portfolio theory and the model to operationalize it. Chapter III presents a review of the literature. Chapter IV describes the inputs required of the model, and details the various extensions and modifications made to these inputs. Chapter V contains a description of the data used, and details the construction of the investment universes and the benchmark portfolios. Chapter VI presents the portfolio returns and compositions of the active strategies. Chapter VII examines the results from the performance measurement tests. Finally, Chapter VIII summarizes the thesis, states the conclusions and discusses possible extensions of the research.

II. The Multiperiod Portfolio Model

Consider the simple reinvestment problem, where we assume markets are perfect and returns are independent, but not necessarily stationary, over time. Let the investor have a preference function U_0 (with $U_0' > 0$, $U_0'' < 0$) defined on terminal wealth w_0 (time 0). If we let w_n denote the investor's wealth with n periods to go, r_{in} the return on asset i in period n, z_{in} the amount invested in asset i in period n (with i = 1 being the riskless asset), and $U_n(w_n)$ the relevant, but unknown, utility of wealth with n periods to go, then the investor's wealth at the end of period n is

$$w_{n-1}(\underline{z}_n) = \sum_{i=2}^{M} (r_{in} - r_{1n})z_{in} + w_n(1 + r_{1n}),$$

where $\underline{z}_n' = (z_{2n}, \ldots, z_{Mn})$, with the prime denoting transposition, and M is the number of securities.

Now consider the portfolio problem with one period to go. The investor, with wealth w_1 to invest, must solve

$$\max_{\underline{z}_1 | w_1} E\left[U_0(w_0(\underline{z}_1)) \right] = U_1(w_1).$$

Clearly, $U_1(w_1)$ is the highest attainable expected utility given w_1 and thus is the induced utility of wealth[8] with one period to go. The portfolio problem with two periods to go is

$$\max_{\underline{z}_2 | w_2} E\left[U_1(w_1(\underline{z}_2)) \right] = U_2(w_2).$$

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[8]It is known as a derived utility function since it is derived from a specific $U_0(w_0)$.

The induced utility of wealth with n periods to go is given by the recursive equation

$$U_n(w_n) = \max_{\underline{z}_n | w_n} E \left[U_{n-1}(w_{n-1}(\underline{z}_n)) \right], \qquad n=1,2,\ldots$$

Thus, $U_n(w_n)$ is the expected utility of following an optimal policy from period n to 0 (terminal date) given that w_n dollars are available at n. We can see from the above that the induced utility of current wealth, $U_n(w_n)$, generally depends on "everything", namely, the utility function of terminal wealth, $U_0(w_0)$, the joint distribution functions of future returns, and future interest rates. Furthermore, to derive $U_{n-1}(w_{n-1})$, the investor must solve a portfolio problem in each period for all levels of wealth. Moreover, $U_{n-1}(w_{n-1})$ may not have the same functional form as $U_0(w_0)$.

However, Mossin (1968) showed that $U_n(w_n)$ depends only on U_0 if and only if $U_0(w_0)$ is isoelastic, i.e.,

$$U_0(w_0) = \frac{1}{\gamma} w^\gamma, \qquad \gamma < 1.$$

(Note that for $\gamma = 0$, $U_0(w_0) = \ln w_0$.) We can now write

$$U_n(w_n) = \frac{1}{\gamma} w_n^\gamma . \tag{1}$$

For these utility functions, the optimal investment policy, $\underline{z}_n^*$, is proportional to wealth; that is,

$$z_{in}^*(w_n) = x_{in}^* w_n, \qquad \text{all } \gamma,\ \gamma < 1, \text{ all } i, \tag{2}$$

where the x_{in}^* are constants. In addition, these preferences are also completely myopic since they depend only on U_0 and the return structure for the current period (and not on future periods). Finally, only functions of family (1) exhibit constant relative risk aversion.[9] From (2), we see that

$$U_n(w_n) = \frac{1}{\gamma} w_n^\gamma \quad \Longleftrightarrow \quad V_n(1 + r_n) = \frac{1}{\gamma} (1 + r_n)^\gamma ;$$

that is, the utility of wealth relatives, $V_n(1 + r_n)$, is of the same form as the utility of wealth. This holds only for family (1).

We note that these properties, while interesting, are clearly restricted to utility functions of class (1). However, Leland (1972), Hakansson (1974), Ross (1974), and Huberman and Ross (1983), showed the important result

$$U_n(w_n) \longrightarrow \frac{1}{\gamma} w_n^\gamma \qquad \text{for some } \gamma < 1, \tag{3}$$

holds for a very broad class of terminal utility functions $U_0(w_0)$; that is, the induced utility function $U_n(w_n)$ converges to an isoelastic function. Furthermore, Hakansson (1974) has shown that (3) is usually accompanied by a convergence in policy; that is[10]

$$\underline{z}_n^* \longrightarrow \underline{x}_n^* w_n \qquad \text{for some } \gamma < 1$$

Thus the objectives given by (1) encompass a broad variety of different goal formulations for investors with intermediate- to long-term investment horizons.[11] In addition, since the relative risk aversion function is $1-\gamma$, the family (1) incorporates a full range of risk attitudes, ranging from risk neutrality ($\gamma = 1$) to infinite risk aversion ($\gamma = -\infty$).

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[9] Relative risk aversion is defined as $-wU''(w)/U'(w)$ and equals $1-\gamma$ for the family (1)

[10] Convergence to an isoelastic policy at n does not imply the isoelastic policy will be optimal to the end. In other words, if Interstate 80 is a good route from Boston to San Francisco, then it is an equally good route to Los Angeles or Seattle, but only as far as Salt Lake City. See Hakansson (1974).

[11] However, the simple reinvestment formulation ignores consumption.

Summarizing, the several noteworthy properties of the isoelastic class of utility functions are: (i) they are consistent with multiperiod expected utility maximization whenever returns are independent over time (although this is not required when $\gamma = 0$). Moreover, the investment objective is quite robust, encompassing a wide variety of tastes when the investment horizon is intermediate- to long-run. (ii) They are myopic in that the return structure beyond the current period is not required. (iii) They are the only class of functions for which we can formulate the investment problem in a rate of return setting as opposed to wealth for multiperiod horizons. (iv) They exhibit decreasing absolute risk aversion, which implies that risky assets are normal goods. (v) They span a continuum of risk attitudes, from risk neutrality to infinite risk aversion. Moreover, they are aptly suited to the multiperiod reinvestment problem, particularly for the institutional investors, since the functions (except for $\gamma = 1$) display an aversion to negative returns and bankruptcy that increases as γ decreases.

We now operationalize multiperiod portfolio theory. At the beginning of each period t, the investor chooses a portfolio, $\underline{x}_t$, on the basis of some member, γ, of the family of utility functions for returns given by

$$V(1+r_p) = \frac{1}{\gamma}(1+r_p)^{\gamma}. \tag{4}$$

This is equivalent to solving the following problem in each period:

$$\max_{\underline{x}_t} E\left[\frac{1}{\gamma}(1+\tilde{r}_{pt})^{\gamma}\right] = \max_{\underline{x}_t} \sum_s \pi_{ts}\frac{1}{\gamma}(1+r_{pts})^{\gamma} \tag{5}$$

subject to:

$$x_{it} \geq 0,\ x_{Lt} \geq 0,\ x_{Bt} \leq 0, \qquad \text{all } i,\ t \tag{6}$$

$$\sum_i x_{it} + x_{Lt} + x_{Bt} = 1, \qquad \text{all } t, \tag{7}$$

$$\sum_i m_{it} x_{it} \le 1, \qquad \text{all } t, \tag{8}$$

$$\text{pr } (1 + \tilde{r}_{pt} \ge 0) = 1, \tag{9}$$

where

$r_{pts} = \sum_i x_{it} r_{its} + x_{Lt} r_{Lt} + x_{Bt} r^d_{Bt}$, is the ex-ante return on the portfolio at time t in state s,

$\gamma \le 1$ = a parameter that remains fixed over time,

x_{it} = the amount invested in risky asset i in period t as a fraction of own capital,

$\underline{x}'_t$ = $(x_{1t}, \ldots, x_{Mt}, x_{Lt}, x_{Bt})$, where $\underline{x}_t$ is a column vector and a prime denotes transposition,

$\tilde{r}_{it}$ = the random return expected on asset i in period t,

r_{Lt} = the return on the riskless asset in period t,

r^d_{Bt} = the borrowing rate at the time of the decision at the beginning of period t,

m_{it} = the initial margin requirement for asset i in period t expressed as a fraction, and

π_{ts} = the probability of state s in period t, in which case the random return $\tilde{r}_{it}$ will assume the value r_{its}.

Constraint (6) rules out short positions[12] and (7) is the budget

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[12]While the program can solve (5) to find the optimal portfolio with or without this constraint, we have it in for two reasons: (1) many institutional investors are constrained by law to hold only long positions, and (2) so that this study is comparable to previous ones which explicitly considered this constraint.

constraint. Constraint (8) serves to limit borrowing (when desired) to the maximum permissible under the margin requirements that apply to each of the various assets. Finally, (9) is the solvency constraint which rules out any (ex-ante) probability of bankruptcy. Note that with finite return distributions, this constraint is not binding for $\gamma < 1$ because of the power functions' aversion towards negative returns and bankruptcy. However, we explicitly consider this constraint in formulating the maximization problem to prevent the algorithm from considering infeasible solutions as it searches for the optimum.

Several inputs are required to operate this model. First, we need an estimate of the joint return distribution of the investment universe for the next period.[13] Second, we need to specify the return on a riskless asset and a *decision* borrowing rate (when leverage opportunities are permitted) at the beginning of the holding period considered. Finally, the margin requirements must be given when borrowing is allowed. A detailed discussion of these inputs will be given in Chapter IV.

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[13] See Bawa, Brown, and Klein (1979) for a comprehensive look at the issues and problems involved with the estimation of return distributions.

III. Literature Review

This chapter reviews the literature relating to: (1) applications of multiperiod investment theory (the multiperiod theory itself was reviewed in Chapter II); (2) the relationship between applications of multiperiod portfolio theory and mean-variance analysis; and (3) studies relating to industry analysis.

A. Applications of Multiperiod Portfolio Theory

As noted, the multiperiod theory was reviewed in Chapter II. This section reviews the application of multiperiod portfolio theory to the rebalancing of portfolios over time. Grauer and Hakansson (1982) was the first study applying multiperiod portfolio theory to the rebalancing of portfolios over time.[14] Since that time, three more articles from the same authors have made their appearance in the finance literature, viz. Grauer and Hakansson (1985,1986,1987). The first three articles explored active asset allocation strategies in a domestic setting composed of U.S. common stocks, corporate bonds, government bonds and a riskless asset. Borrowing was ruled out in the first article while margin purchases were permitted in the other two. In addition, the third article included small stocks as a separate investment vehicle. Thus, the first three articles in this area considered only major U.S. asset categories as the investment universe.

The model given in Chapter II, equations (5)-(9), was the one that

[14]This study is actually the second (chronologically) to appear in the finance literature, but the first in a major journal. Grauer and Hakansson (1981) appeared in a German publication.

Grauer-Hakansson used in their studies. In essence, they maximized the expected utility of wealth for utility functions of the isoelastic class for each period. The constraints in the model were: (1) no short sales were permitted, (2) the budget constraint, i.e., the asset weights, including borrowing and lending, must sum to one, (3) leverage, when permitted, must not exceed the margin requirements of each asset class, and (4) insolvency, i.e., the ex-ante probability of bankruptcy, was ruled out.

The major input to their model was an estimate of the next period's joint return distribution. In their studies, Grauer-Hakansson used the so-called simple probability assessment approach. The idea was the following: at the beginning of period t, the realized returns of the most recent N periods were recorded; each of the N joint realizations in periods t-N through to t-1 was assumed to have probability 1/N of occurring in the upcoming period. Thus, estimates were obtained on a moving basis and used in raw form without adjustment of any kind.

Turning first to the 1982 and 1985 articles, Grauer-Hakansson considered an investment universe composed of U.S. stocks, corporate bonds, government bonds, and a riskless asset. The first article did not permit leverage while the second did, and both employed annual and quarterly revisions. The results revealed that there were substantial gains to be had from applying long-run investment theory to portfolio selection. The gains from diversification were especially sharp, particularly for the more risk averse investors. However, there seemed to be only very minor differences when portfolios were revised once a year versus quarterly. Finally, a comparison between levered and unlevered portfolios produced results that were to be expected. The highly risk averse investors never borrowed, so the availability of margin purchases made no difference to their portfolio returns, while the more risk tolerant investors were fairly liberal in their use of leverage, occasionally employing up to the maximum allowed. As to be expected, leverage increased the variability of portfolio returns, and in the case of most investors, also increased their realized returns.

When small stocks were included in the investment universe, Grauer and Hakansson (1986) found the conclusions from their previous studies to be generally unaltered. Small stocks, when chosen, tended to replace common stocks in the portfolios. This had a notably positive effect on realized returns for all investors, which is not surprising.[15] Moreover, the performances of the active strategies, when compared with fixed weight portfolios of similar riskiness, were statistically significantly higher in some cases.

So far, the studies reviewed have employed a "domestic" universe; that is, only U.S. assets were considered. In Grauer and Hakansson (1987), the investment universe was expanded to include the four principal U.S. asset groups and up to fourteen non-U.S. equity and bond categories.[16] The principal

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[15] Many investigators, for example Banz (1981), and Reinganum (1981), have noted that small stocks have produced excess risk-adjusted returns. This is now commonly known as the "small firm effect".

[16] When we examine the international arena, we find many studies of international diversification, but most were based upon the mean-variance model of portfolio choice at a point in time. One of the earliest was by Grubel (1968) who showed the benefits of international diversification for eleven countries from 1959-66. The (expected) result was that a portfolio of international assets dominated (in the mean-variance sense) a portfolio of U.S. stocks only. Subsequently, Levy and Sarnat (1970) put forth a study examining the gains from international diversification of twenty-eight countries. The conclusions reached were generally similar to those of Grubel. Again, these and other studies (see the references cited in Adler and Dumas (1983) for a comprehensive list of studies) in this area only looked at portfolio choice at a point in time.

findings were: (1) the gains from including non-U.S. asset categories were dramatic, especially so for the more risk averse investors, (2) there were large gains from removing the no leverage constraint compared with when only U.S. assets were the investment universe, and, (3) investment in the U.S. assets were mostly non-existent in the presence of non-U.S. categories, which provided strong evidence of market segmentation.[17]

Overall, the Grauer and Hakansson studies have shown that applying multiperiod portfolio theory to the construction and rebalancing of portfolios composed of major U.S. and international asset categories can be remarkably successful. The results were all the more remarkable when we consider that only the simple probability assessment approach was used to form an estimate of the next period's joint return distribution. This certainly does not bode well for the weak-form of the efficient markets hypothesis.

More recently, Grauer and Hakansson (1988) refined the simple probability assessment approach by including an inflation adapter to adjust the raw estimates of next period's joint return distribution. At the beginning of period t, the following regression is run:

$$r_{ij} = \alpha_i + \beta_i r_{Ij} + \epsilon_{ij} , \qquad j=t-1 \text{ to } t-N,$$

where r_{ij} is the return on asset i in period j, and r_{Ij} is the inflation rate in period j. This regression is run for data contained in the same time frame as that used in estimating the joint return distribution employing the simple probability assessment approach. In other words, the realized returns of the most recent N periods are regressed against the inflation rates of the most

[17] Agmon (1973) and Lessard (1973) also provided evidence of market segmentation.

recent N periods. The simple probability assessment approach to estimating the joint return distribution in period t is then adjusted by the following equation:

$$\hat{r}_{ij} = r_{ij} + \hat{\beta}_i(r_{Lt} - \bar{r}_{Lj}), \qquad j=t-1 \text{ to } t-N,$$

where $\hat{\beta}_i$ is the estimated regression slope coefficient, r_{Lt} is the return on the riskless asset for period t, $\bar{r}_{Lj}$ is the (arithmetic) average return of the riskless asset in the most recent N periods, r_{ij} is the realized rate of return on asset i in period j for j=t-1 to t-N. Presumably, if $r_{Lt} - \bar{r}_{Lj}$ is positive, then what the "market" is telling us is that (unless real interest rates have gone up) the inflation rate in period t is expected to be higher than the average inflation rate over the preceding N periods. Thus, it is only "rational" to assume that, if investors expect a higher inflation rate in period t, then the expected return on asset i should be affected through the inflation rate and $\hat{\beta}_i$, since $\hat{\beta}_i$ reflects the relationship between asset i's returns and inflation in the past N periods.

This inflation adapter method to refining the raw joint empirical distribution approach was applied to choose portfolios composed of the value-weighted market index of New York Stock Exchange stocks and Treasury Bills. Basically, Grauer and Hakansson applied this technique to determine the "right" time to move out of the stock market and into Treasury Bills and vice versa. Traditionally, this has been the approach taken by investors who feel that they do not have micro-selectivity,[18] but by analysing broad macro-economic variables are able to "time the market". This approach to

[18]Micro-selectivity is the ability to identify under-priced securities in the stock market and thereby include them in the portfolio.

"timing the market" was suprisingly successful, especially in the 1966-85 period.[19]

B. A Comparison of Power Utility and Mean-Variance Portfolio Choice

Even though multiperiod portfolio theory has been around since the early 1970s, it has been largely ignored in portfolio selection applications. This is so despite the fact that the multiperiod model has a strong theoretical foundation and is particularly well suited to the problem of rebalancing portfolios over many periods. However, a disadvantage of these models may be in the computational problems and costs that arise when applying theory to practice.[20]

It is well known that finding the set of mean-variance efficient portfolios is typically less computationally burdensome than finding an optimal portfolio through expected utility maximization. Thus, there have been many studies examining how closely portfolios chosen on the basis of functions of means and variances approximate those picked by expected utility maximization.[21] However, these studies just examine the portfolio choices at a point in time and none went so far as to construct and rebalance the portfolios over many periods.

C. Industry Studies

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[19] It can be seen that if inflation is low or non-existent, as it was in the thirties through to the mid-sixties, this approach will have no significant impact on the raw joint distribution.

[20] See, for example, Kroll, Levy and Markowitz (1984), and Grauer (1981a).

[21] See, for example, Ziemba, Parkan, and Brooks-Hill (1974), Pulley (1981, 1983), Kallberg and Ziemba (1983), Kroll, Levy and Markowitz (1984), and Grauer (1986).

There have been no studies applying multiperiod portfolio theory to the industry sectors of the U.S. stock market. This is not surprising since the Grauer-Hakansson studies reviewed in *Section A* were the first to employ the multiperiod model. However, there are several studies focussing on industry analysis and the need to do such analyses.

King (1966) was one of the earliest studies on industry analysis. He was concerned with whether industry factors were present in individual stock price movements. He found that approximately 10-15% of the variance of individual stocks were related to the industry component after taking into account the market factor. Later studies by Meyers (1973) and Livingston (1977) had results that were consistent with King's. They concluded that there existed a pervasive industry influence on the performance of stocks over time. This conclusion emphasized the need for portfolio managers to perform such analyses so as to obtain higher returns and lower risks in the long run.

Studies examining the performance of industries over time include Latané and Tuttle (1968), Brigham and Pappas (1969), and Reilly and Drzycimski (1974). These studies showed that differences in performance between industries were substantial. For example, Latané-Tuttle found that the market increased by five times in the period 1950-67 while the industries had varying changes; one industry declined while another had an increase of about forty times over the same time period. Moreover, these studies, plus one by Tysseland (1971), showed that there was almost no association (i.e., correlation) in industry performance over time, which lent support to the weak-form efficient markets hypothesis. However, this does not imply that industry analysis is useless. On the contrary, these studies do support the concept of industry analysis and of an industry influence on individual stock performance. The evidence showed that industries do not perform in the same way over time, and therefore this makes industry analysis all the more important to the portfolio manager.

On a related topic, Farrell (1974,1975) investigated the clustering of companies along other lines. In particular, he used a broader than industry classification (stable, cyclical, growth and energy) to see if the price action of stocks conformed to this classification. He did find that the four stock groupings were homogeneous; stocks within each group were highly correlated, and the inter-group relationship showed near independence. Moreover, Farrell (1975) showed that there were substantial benefits to be had from an ex-post group rotation strategy among these four classifications.

More recently, Sorensen and Burke (1986) examined portfolio returns from active industry group rotation. They considered forty-three industries from 1972-84 and applied a "relative strength" trading rule, rather than any portfolio selection models, to rotate in and out of these industries.[22] The measures used to judge the performance of the portfolios formed by this technique were the Sharpe index, the Treynor index, and Jensen's alpha.[23]

[22]For each industry, the relative strength index is calculated. This index is formed by the ratio of an industry's current price to its average price over the previous six months. Portfolios are formed based on this index. The rule is: sell an industry when its index falls below a specific rank (e.g., below 30%), and replace it with the next highest ranking industry not in the portfolio. Each industry in the portfolio is equally weighted. For more details, see Sorensen and Burke (1986).

[23]The Sharpe index is defined as $(\bar{r}_p - r_L)/\sigma_p$ where $\bar{r}_p$ is the average return on a portfolio, r_L is the riskless return, and σ_p is the standard deviation of returns of portfolio p. The Treynor index is defined as $(\bar{r}_p - r_L)/\beta_p$ where β_p is the beta of portfolio p. Jensen's alpha is the intercept term in the characteristic line regression; that is, when we regress the excess returns of portfolio p against the excess returns of the market.

Based on such measures, the overall conclusion was that that some strategy of group rotation may be of use to portfolio managers. In fact, the strategies that did the best were those that were not very active, However, in the full period considered, 1972-82, this "relative strength" method of group rotation did not lead to superior performance, while in the sub-period 1977-82 it did. Thus, this technique has severe limitations when employed in highly cyclical markets (which 1972-82 was).

IV. Model Inputs and Statistical Tests of Investment Performance

We now describe the inputs required when applying the multiperiod portfolio model described in Chapter II to industry groupings of the U.S. stock market. The investment universe considered is either an eight, twelve or twenty-four industry grouping of the New York Stock Exchange.[24] Both equal- and value-weighted industry indices are used. Details of these industry groupings and their formation will be given in Chapter V.

A. Joint Return Distribution Estimation

1. The Simple Probability Assessment Approach

The major input to the model is an estimate of the joint return distribution of the industries for the next period.[25] We initially follow previous multiperiod studies[26] by employing the so-called simple probability assessment approach. As described in Chapter III, this approach works in the following manner. Suppose quarterly revision is used. Then, at the beginning of quarter t, the realized (industry) returns of the most recent N quarters are recorded; each of the N joint realizations in quarters t-N through to t-1 is assumed to have probability 1/N of occurring in the coming quarter t. Thus, estimates are obtained on a moving basis and used in raw form without

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[24] The eight industry breakdown comes from Sharpe (1982); the twelve industry grouping follows that of Breeden, Gibbons and Litzenberger (1986), while the twenty-four industry classification is basically derived from the twelve industry grouping by breaking each of the twelve into more specific industries. See Chapter V for more specific details.

[25] See Bawa, Brown, and Klein (1979) for a comprehensive look at the issues and problems involved with the estimation of return distributions.

[26] See Grauer and Hakansson (1982,1985,1986,1987).

adjustment of any kind.[27] Note that there is no information loss involved here because the whole joint distribution is specified; all moments and correlations are implicitly taken into account.

Having estimated the joint return distribution for quarter t, the only other inputs required are the (observable) riskless return, r_{Lt}, and the (observable) *decision* borrowing rate, r^d_{Bt}, for quarter t. The former is assumed to be the 91-day U.S. Treasury bill maturing at the end of quarter, while the latter is assumed to be the call money rate plus 1% at the beginning of quarter.

We initially let N = 32 quarters for each of the equal- and value-weighted eight, twelve, and twenty-four industry investment universes; that is, we use the realized returns of the most recent 32 quarters as our estimate of the joint return distribution.[28] In addition, we examine the effect on portfolio policies and their returns when we allow N to be 28 and 40 quarters for the twelve equal- and value-weighted industries.[29] Thus we replicate the Grauer-Hakansson methodology on a new and different data set.

2. The Simple Probability Assessment Approach With An Inflation Adapter

Recently, Grauer and Hakansson (1988) employed an inflation adapter method to refine the simple probability assessment approach. Again, we replicate their inflation adapter method for the twelve equal- and

[27] If the investor has no information about the form and parameters of the true distribution, but believes that this distribution went into effect N quarters ago, then it is optimal to use the empirical distribution of the past N quarters. See Bawa, Brown, and Klein (1979), p. 100.

[28] This follows the cited Grauer and Hakansson studies where they mostly used a 32 quarter estimating period when quarterly portfolio revisions were considered. They also experimented with 40 quarters as the estimating period.

[29] The twelve industry universe with the most recent 32 quarters as the estimate of the joint return distribution is our base case. Thus, we examine deviations from the base case when we employ the last 28 and 40 quarters as the estimate of the return distribution, *ceteris paribus*.

value-weighted industry investment universe (our base case) to see if the same general conclusions reached by Grauer-Hakansson can be supported. As described earlier in Chapter III, the following regression is run for each industry at the beginning of quarter t:

$$r_{ij} = \alpha_i + \beta_i r_{Ij} + \epsilon_i, \qquad j=t-1 \text{ to } t-N,$$

where r_{ij} is the return on industry i in quarter j and r_{Ij} is the inflation rate in quarter j. Suppose N = 32 quarters are employed in the simple probability assessment approach. Then, the preceding 32 quarters of returns on industry i are regressed on the same 32 quarters of inflation rates. We now adjust the raw estimates of the joint distribution to be

$$\hat{r}_{ij} = r_{ij} + \hat{\beta}_i(r_{Lt} - \bar{r}_{Lt}), \qquad j=t-1 \text{ to } t-N,$$

where $\hat{\beta}_i$ is the regression slope coefficient, r_{Lt} is the riskless return for quarter t, $\bar{r}_{Lt}$ is the (arithmetic) average return on the riskless asset for the most recent N quarters, and r_{ij} is the realized rate of return on industry i in quarter j, for j = t-1 to t-N. Note that while we adjust the magnitude of the returns in the joint distribution, we still give a probability of 1/N to each joint realization. The rationale for this approach is to consider the impact of inflationary expectations on our estimates of the joint return distribution. If changes in the U.S. Treasury bill rate reflect investors' expectations about inflation in the coming period (given that the real interest rate has not changed), then our estimates of next quarter's returns should be affected by the right hand side of the above equation.

3. *A "Sum-of-the-Digits" Probability Assessment Approach*

The simple probability assessment approach assigns equal probabilities to each joint realization in the estimate of the return distribution. We now introduce a completely new way to assign these probabilities to the joint realizations of our base case. These probabilities are assigned by a "sum-of-the-digits" rule which operates as follows. Let

$$K = \sum_{k=1}^{N} k .$$

Then, at the beginning of quarter t, the joint realization of quarter t-1 is given probability N/K; the joint realization of quarter t-2 has probability (N-1)/K; and so on until the joint realization of quarter t-N has probability 1/K of occurrence. Thus, we have assigned more weight to the recent observations. The "sum-of-the-digits" method is an exponential decay-type function and the idea is borrowed from the exponentially weighted moving average (EWMA) model of univariate time series modelling. Consider the simple probability assessment approach: we are saying that the forecast for the next period is the (simple) average of the past N realized return vectors. The impetus behind the "sum-of-the-digits" notion is a "common-sense appeal" that the recent past would be a better guide to the next period than the more distant past.[30]

4. *An "All-of-History" Simple Probability Assessment Approach*

As noted, the Grauer-Hakansson studies have employed a simple probability assessment approach, which is a "moving window" method to estimating next period's joint distribution. That is, only the most recent N periods of realized returns are used, and as we move sequentially forward in time, the earliest observation is dropped while the most recent one is added.

[30] The method is arbitrary, but perhaps no more or less than assigning equal probabilities to each joint realization.

Thus, implicit in their approach is that the return distribution is only stationary for the last N quarters. We now modify this by assuming that the world is stationary by considering an "all-of-history" method[31] whereby all past returns are used in estimating the raw joint distribution. In other words, at the beginning of quarter t, returns from quarter 1 (the first available data) to quarter t-1 are used. At the beginning of quarter t+1, returns from quarter 1 to quarter t will now be the estimate of the joint distribution, and so on. Each joint realization is given an equal probability 1/(t-1) of occurring in quarter t. Note that the probabilities become smaller as we move forward in time, unlike the ("moving window") simple probability assessment approach. This technique is applied to our base case.

5. A "Disaster States" Scenario Probability Assessment Approach

Finally, we introduce a "disaster states" scenario in estimating the return distribution of our base case. This idea is a modification of the simple probability assessment approach, and is as follows. Let there be a universe of M industries and let N be the number of quarters of realized returns used in the simple probability assessment approach to estimate the next quarter's return distribution (M = 12 and N = 32 in our base case). At the beginning of quarter t, the worst state for each asset i from quarter 1 (first observation) to quarter t-1 (most recent observation) is recorded. Thus we should obtain M such states (one for each asset in the universe). Then we append these M worst states to the most recent N states to obtain

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[31]Notice that this method contrasts with the "sum-of-digits" approach. In this case, we would like to use every shred of information available to estimate the joint return distribution.

$M + N$ states as our estimate of the joint return distribution for quarter t.[32]

The probabilities we assign to these states are now determined by the following rule:

Probabilities of each of the N most recent states	Probabilities of each of the M worst states
$\frac{1}{N + J}$	$\frac{J}{(N + J)\ M}$

where J is an integer and $1 \le J \le M$. For example, if we let $J = M$, then all we are doing is assigning each of the $N + M$ states a probability of $1/(N+M)$; that is, equal probability. We examine three variations around our base case here; we let $J = 1$, 6, and 12, and $N = 32$ quarters. Suppose $J = 1$. Then we see that each of the N ($= 32$) "normal" states has probability 1/33 of occurrence, and each of the M ($= 12$) "disaster" states has probability $1/(33 \cdot 12)$ of occurrence. When $J = 12$, we are assigning the "disaster" states a probability equal to each of the "normal" states; when $J = 6$, a lower probability is assigned to each of the "disaster" states than to the "normal" states; and when $J = 1$, we are assigning the lowest probability to the "disaster" states.

The motivation for the use of a "disaster states" scenario is to keep the investor aware that such states may occur at any time, but not to give it a probability of occurrence such that it will completely drive the investor out of the equity markets. Thus, we have made the simple probability assessment estimate of the return distribution more conservative, and by letting J vary from 1 to M, have varied the degree of conservatism.

[32] The "moving window" method places a zero probability on a previous disaster state (e.g., the fourth quarter of 1929) if it does not fall within the last N quarters (i.e., it is out of the window). This provides the motivation for the "disaster states" approach.

Given these inputs, the portfolio weights for the various assets and the proportion of assets borrowed (if permitted) are calculated by solving system (5) - (9) in Chapter II via non-linear programming methods.[33] At the end of quarter t, the realized return on the portfolio is determined, using the weights selected at the beginning of quarter t. This cycle is repeated in all subsequent quarters.

We report returns gross of transactions costs and taxes, and assume that the investor cannot influence prices. This is in line with the assumptions made in previous multiperiod studies. The reasoning is, first, the data series used as inputs also exclude transactions costs (for reinvestment of dividends) and taxes. Furthermore, a set of benchmark portfolios is constructed from this data series for comparison with the active strategies and these benchmark portfolios also exclude transactions costs and taxes. Second, many institutional investors are tax-exempt, and there are techniques available for keeping transactions costs low.[34]

Finally, we present the portfolio compositions of selected active strategies to detect the differences, if any, between the various return distribution estimation techniques.

B. Statistical Tests of Investment Performance

To judge the performance of the active strategies, we test whether there is any statistical difference in the returns of the active strategies with quarterly revision, both with and without leverage opportunities, under the

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[33]The non-linear programming algorithm employed is described in Best (1975).
[34]Furthermore, the proper treatment of transactions costs and taxes are nontrivial.

following scenarios. (1) The twelve industry universe versus the eight and twenty-four industry universe (both value- and equal-weighted), for $N = 32$ quarters under the simple probability assessment approach to estimating the joint return distribution. (2) The use of $N = 32$ versus 28 versus 40 quarters under the simple probability assessment approach for the twelve equal- and value-weighted industry investment universe. (3) The different methods for estimating the joint return distribution for the twelve industry universe when $N = 32$ quarters; that is, the simple probability assessment approach (our base case) versus the inflation adapter approach versus the "sum-of-the-digits" approach versus the "disaster state" scenario (for $J = 1$, 6, and 12) versus the "all-of-history" approach. (4) The comparison of selected base case active strategies against the passive and semi-passive benchmark portfolios.[35] We report paired t-statistics for the four cases outlined above.[36]

The paired *t*-test statistic is constructed as follows. The terminal wealth w_0 is given by

$$w_0 = w_n (1 + r_n)(1 + r_{n-1}) \; \ldots\ldots \; (1 + r_1)$$

$$= w_n \exp \left[\sum_{t=1}^{n} \ln(1 + r_t) \right],$$

[35]The passive benchmarks are the CRSP value-weighted index levered up and down, and the twelve individual value-weighted industry indices themselves. The semi-passive benchmarks are the equally weighted portfolios of the twelve equal-weighted industry indices levered up and down, plus the individual equally weighted indiustry indices. Chapter V contains a more detailed discussion of the construction of these benchmark portfolios.

[36]This test is also used in Fama and MacBeth (1974) and Grauer and Hakansson (1986,1987,1988).

where w_n is current wealth, and r_t is the portfolio return[37] in period t for a particular γ. Note that the returns compound multiplicatively, so we employ the paired t-test for dependent observations to the quarterly (and additive) variables $\ln(1 + r_t)$. Thus, to compare the return series $r_1^1, \ldots, r_n^1$ with the return series $r_1^2, \ldots, r_n^2$ for two different strategies under different scenarios, we calculate the statistic

$$t = \frac{\bar{d}}{\sigma(d) / \sqrt{n}} ,$$

where

$$\bar{d} = \sum_{t=1}^{n} \frac{\ln(1+r_t^1) - \ln(1+r_t^2)}{n}$$

and $\sigma(d)$ is the standard deviation of $[\ \ln(1+r_t^1) - \ln(1+r_t^2)\ ]$. In each case, the null hypothesis is that

$$E\ [\ \ln\ (1 + r_t^1)\ ] = E\ [\ \ln\ (1 + r_t^2)\ ]$$

while the alternative hypothesis is that

$$E\ [\ \ln\ (1 + r_t^1)\ ] > E\ [\ \ln\ (1 + r_t^2)\ ].$$

C. Performance Measures

Finally, we present tests of abnormal performance for the active strategies: (1) with and without leverage opportunities present, (2) when managing the twelve equal- and value-weighted industry investment universes under the various return distribution estimation methods, and (3) when managing the eight and twenty-four industry investment universes (both equal- and value-weighted) when N = 32 quarters. The standard academic measures of

[37] Note we have dropped the subscript p for convenience.

performance are the ex-post characteristic line α (also known as Jensen's (1968) performance index) and the Treynor-Mazuy (1966) and Henriksson-Merton (1981) tests of market timing.[38] We now discuss each of these performance tests in turn.[39]

1. The Jensen Performance Index

For the Jensen performance index, we run the following characteristic line regression for each portfolio p of the active strategies:

$$r_{pt} - r_{Lt} = \alpha_p + \beta_p (r_{mt} - r_{Lt}) + \epsilon_{pt},$$

where r_{mt} is the return on the CRSP value-weighted index, r_{Lt} is the return on 91-day U.S. Treasury Bills, and r_{pt} is the portfolio return on an active strategy. The intercept, α_p , is the measure of abnormal investment performance, where a positive (negative) value indicates superior (inferior) performance. The null hypothesis is $\hat{\alpha}_p = 0$ (no superior or inferior performance), and the alternative hypothesis is $\hat{\alpha}_p > 0$ (there is superior performance). Thus, the results of one-tailed t-tests are reported.

2. The Treynor-Mazuy Test For Market Timing

Treynor and Mazuy postulated the following test for a fund manager's market timing ability:

$$r_{pt} - r_{Lt} = \alpha_p + \beta_{1p} (r_{mt} - r_{Lt}) + \beta_{2p} (r_{mt} - r_{Lt})^2 + \epsilon_{pt} ,$$

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[38] We also run these tests with a correction for heteroscedasticity.

[39] Note that the application of multiperiod portfolio theory to group rotation is not exactly a market timing strategy (in the Henriksson-Merton or Treynor-Mazuy sense), nor is it simply a portfolio selection strategy (in the Jensen sense). Thus one could argue that none of these measures will give a completely accurate measure of the investment performance of the multiperiod strategies. On the other hand, these performance measures are the benchmarks for measuring the performance of professional money managers and they could make exactly the same arguments. Therefore, we judge the multiperiod strategies against these same commonly accepted benchmarks.

where the notation is as before. If the manager has (positive) market timing ability, then $\hat{\beta}_{2p} > 0$. The idea behind this test is quite intuitive. Basically, a superior fund manager will increase a fund's target beta to η_2 if he assesses correctly that $r_m - r_L > 0$ (an "up" market) in the upcoming period, and will target the fund's beta to a low η_1 if the assessment is $r_m - r_L < 0$ (a "down" market), where $\eta_2 > \eta_1$. Thus, the manager will have a very low beta fund in "down" markets, and a high fund beta in "up" markets. Thus, we expect to find $\hat{\beta}_{2p} > 0$ for a successful market timer.

3. The Henriksson-Merton Test For Market Timing

Merton (1981) also postulated, in a Capital Asset Pricing Model framework, the two-target-beta strategy. As in the Treynor-Mazuy test, the fund manager sets the fund's beta to η_1 if the forecast in the coming period is $r_m - r_L < 0$, and increases the fund's beta to η_2 if $r_m - r_L > 0$, where $\eta_2 > \eta_1$. Henriksson and Merton (1981) developed the following test for market timing:

$$r_{pt} - r_{Lt} = \alpha_p + \beta_{1p} (r_{mt} - r_{Lt}) + \beta_{2p} y_t + \epsilon_{pt} ,$$

where $y_t = \max (0, r_{Lt} - r_{mt})$ is equal to the payoff associated with a put option on the market portfolio with excercise price r_{Lt}. The interpretation in the Henriksson-Merton test is that $\hat{\beta}_{1p}$ measures the fund's average beta in "up" markets (i.e., $r_{mt} - r_{Lt} > 0$), while $\hat{\beta}_{2p}$ measure the average **decrease** from $\hat{\beta}_{1p}$ of the fund's beta in "down" markets.[40] Thus, we can test the null

[40]Note that these are just estimates of average betas due to the imperfection of the manager's forecasts. That is, the manager will target a low beta for the fund when in fact the next period turns out to be an "up" market, and vice versa. This creates a problem of heteroscedasticity in the regression estimation where the absolute value of the error term is linearly related to the absolute value of $r_m - r_L$.

hypothesis $\hat{\beta}_{2p} = 0$ where (if not rejected) we would conclude that the manager does not have market timing ability, or does not act on his forecasts.[41]

Thus, we present three measures of investment performance that are CAPM related. The measures are not without their critics.[42] Nevertheless, they are the most well known and used tests in the academic and applied literature. Therefore, we subject the multiperiod strategies to these commonly accepted benchmarks.

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[41]We focus on $\hat{\beta}_{2p}$ as the measure of investment performance. The estimate, $\hat{\alpha}_p$, is a measure of the manager's micro-selectivity; that is, can the fund manager select individual securities with success. However, the $\hat{\alpha}_p$'s are strongly negatively correlated with the $\hat{\beta}_{2p}$'s as evidenced in Henriksson (1984) and Grauer and Hakansson (1988). This means that if the active strategies show positive market timing (i.e., $\hat{\beta}_{2p}$ positive and significant), then they would more than likely also show negative micro-selectivity. One explanation for this can be found in Jagannathan and Korajczyk (1984).

[42]See Roll (1978), Dybvig and Ross (1985), Grauer (1987) for criticisms of using SML (security market line) measures (Jensen's test), and see Jagannathan and Korajczyk (1984) for a criticism of the Henriksson-Merton measure.

V. The Data

The primary source of our data is the 1986 monthly returns tape of the Center for Research in Security Prices of the University of Chicago (CRSP). This tape contains the relevant monthly price, share and return information of all firms on the New York Stock Exchange from December 1925 to December 1986. Furthermore, we used the Standard Industrial Classification (SIC) handbook (1967) as the guide to the industrial classifications of the firms.

A. The Industry Universes

First, we replicate the twelve industry indices of Breeden, Gibbons and Litzenberger (1986),[43] which in turn were an adaptation of Sharpe's (1982) eight industry indices. Basically, firms on the monthly CRSP returns file are grouped into the twelve broad industry categories according to their (first) two-digit SIC code. Table 1a gives the twelve industries and their respective SIC codes. The eight industry universe is patterned after Sharpe (1982). Table 1b gives the eight industries and their respective SIC codes. Finally, Table 1c presents the twenty-four industry classification. This categorization is based upon the twelve industry classification and is formed as follows: each of the twelve industries from Breeden, Gibbons and Litzenberger is examined and further broken down into smaller industries until twenty-four industries are formed. Care was taken to ensure that each

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[43]Note that Breeden, Gibbons and Litzenberger (1986) omitted industries with two-digit SIC codes of 0,2,39,76 and 99. Thus, we followed Sharpe (1982) in assigning these SIC codes to the following industries: 0,39,99 to Consumer Durables, 2 to Food, and 76 to Services.

industry existed from 1926 on.[44]

We now present the details of the construction of the equal- and value-weighted industry indices. Essentially, the methodology used in constructing both types of indices is virtually identical to the CRSP construction of their value-weighted index. First, firms whose shares trade as American Depository Receipts (ADRs) are excluded.[45] Second, we exclude firms with missing price data; that is, the firm is dropped from the industry if its price information is missing, but we include it back as soon as all the information is available. Third, and this is a departure from the CRSP methodology, we exclude firms with missing share data.[46] Furthermore, we construct both the equal- and value-weighted indices from the same universe of firms.[47]

A particular value-weighted industry index is constructed as follows: first all firms with the industry's two-digit SIC code(s) are recorded; then the industry return for a particular month t is just the sum of the value-weighted individual security returns[48] for t. The value-weight of a firm

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[44] While the eight and twelve industry indices are drawn from the same universe of firms, we dropped two SIC classifications in the construction of the twenty-four industry indices. Specifically, two digit codes 00 and 99 are excluded as they represent firms with missing SIC codes on the CRSP database and non-classifiable firms respectively. Thus the twenty-four industry universe has the same or fewer firms than the other two universes. However, there was no difference in the count of firms at the beginning, while the later years only saw a few firms dropped. See Table 2 and footnote 1 as well.

[45] Beginning in 1986, CRSP excluded ADRs in the construction of its value-weighted index.

[46] This missing share data is recorded as zero so that it does not affect the CRSP computation of its value-weighted index. However, we choose to exclude the firm explicitly, so that our count of firms in the universe at any point in time may be smaller than CRSP's.

[47] This is a departure from CRSP's construction of its equal-weighted index. For example, CRSP includes ADRs and firms with missing share data in its equal-weighted index.

[48] These security returns are contained in the RET1 vector on the CRSP database; i.e., they include dividends.

for month t is its beginning (of month t) price times its beginning (of month t) shares outstanding divided by the total equity value of all firms in the industry at the beginning of month t. The quarterly rate of return for the industry is now just the compounded rate of return for the three months in the quarter. Employing the same firms that are used in constructing a particular value-weighted industry index, an equal-weighted industry index is also constructed as the arithmetic average of the returns of all the firms in that industry.

Tables 1a-c give more details on the industries. The tables identify the twelve, eight, and twenty-four industry classifications (plus their SIC codes) respectively, the total number of firms and the total market values in the sample, and the percentage of firms and of market values in each industry at four points in time.[49] These four points in time are chosen to represent the focal points of the dataset and of the portfolio selection problem. Specifically, we choose January 1926 and December 1986 since these are the start and end dates of the CRSP database respectively; January 1934 and January 1966 are chosen because they represent the starting points of our investment horizon — the full period from the first quarter of 1934 to the fourth quarter of 1986, and with the first quarter of 1966 to the last quarter of 1986 as an important sub-period.[50]

B. Other Data Requirments

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[49] From the percentages given, we can calculate the number of firms in each industry at the four points of time.

[50] We choose this sub-period for two reasons: (1) it represents the most recent two decades, and therefore is of interest to investors and portfolio managers, and (2) it is consistent with the previous Grauer and Hakansson studies.

The next piece of information required is the return on a riskless asset; in the portfolio selection problem with quarterly revision, we use the 91-day U.S. Treasury Bill maturing at the end of the quarter. The source of this information is the *Survey of Current Business* and *The Wall Street Journal*. The borrowing rate for *decision* purposes, r^d_{Bt}, is assumed to be the call money rate plus 1%. This rate is viewed as persisting throughout the quarter and therefore riskfree. The sources for this rate are the *Survey of Current Business* for the period 1934-76, and *The Wall Street Journal* for later periods. The borrowing rate used for rate of return calculations, the realized rate, r^r_{Bt}, is calculated as a monthly average. Finally, the margin requirements are obtained from the *Federal Reserve Bulletin*. These are the initial margin requirements; there was no pratical way to take maintenance margin requirements into consideration in the programs. In any event, such requirements would have come into play for the more risk tolerant strategies, and then only occasionally.

Finally, for the inflation adapter method to adjust the joint return distribution, we obtain the inflation rates from the *1988 Yearbook* of Ibbotson Associates. The rates are derived from the Consumer Price Index for All Urban Consumers, not seasonally adjusted (CPI-U, NSA). Prior to 1978, the rates are derived from the CPI (as opposed to the CPI-U). The quarterly rates of inflation are just the compounded monthly rates given in the *Yearbook*.

C. Investment Policies and Their Benchmarks

Next, we describe the portfolios whose returns serve as the benchmarks against which we compare the returns of the active strategies derived from multiperiod portfolio theory. The active strategies have previously been discussed, and therefore we proceed to address the benchmark portfolios. Since the construction of the benchmark portfolios are identical whether we use an eight, twelve, or twenty-four investment universe, we will confine the discussion to the twelve industry universe with the understanding that it also applies to the other universes. Exceptions, when they occur, will be noted.

First, consider the twelve value-weighted industry indices plus borrowing and lending as the investment universe. Thus, the first set of benchmark portfolios is the individual industry sectors themselves. These are shown in Table 2 together with their abbreviated names. Note that these are just pure buy-and-hold strategies.

A second set of benchmark portfolios is the holding of the CRSP value-weighted index with different degrees of leverage. Note that holding this index is akin to holding each of the twelve industries described here in proportion to their respective market values; that is, holding a value-weighted index of the value-weighted industry indices.[51] These benchmarks are shown in Table 2, and are labelled V2-V20. The labels are mnemonic. For example, V2 represents 20% invested in the CRSP value-weighted index and 80% invested in the riskfree asset. Thus, V10 refers to the CRSP value-weighted index, and V20 is now a portfolio with 200% invested in V10 with 100% borrowed. Note that the margin requirements may have made any (or all) of the levered benchmarks, V12-V20, not feasible at a given point in

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[51]This is true for the twelve and eight value-weighted industry indices. However, the twenty-four industry universe has two SIC classifications excluded, i.e., the two digit SIC codes 0 and 99, which represents a missing value and a non-classifiable firm on the CRSP tape. Thus, there may be less firms in this universe than the other two. See Tables 1a-c, and footnotes 1 and 2.

time. The current margin requirement is 50% so that all levered benchmarks are feasible, but there was a 100% margin requirement from the second quarter of 1946 to the first quarter of 1947 so that none of the levered benchmarks were feasible during that time. Hence, we lever the portfolios V12-V20 to either their stated borrowing limits, or to the highest feasible value consistent with the margin requirments.

Second, consider the benchmark portfolios associated with the twelve equal-weighted industry indices plus borrowing and lending as the investment universe. Again, as with the value-weighted industry indices, the individual industry indices are themselves benchmarks. However, note one important difference here. Equally weighting the firms within an industry is not a completely passive strategy as with the value-weighted industry indices. The reason is that equally weighting a portfolio requires an investor to rebalance the portfolio in each period. This rebalancing is very specific; it requires the investor, in each period, to sell the securities that have risen in value and buy those that have fallen so as to maintain the equal weighting scheme of the securities in the portfolio. Thus, we expect the returns on the equal-weighted industry indices to be higher and more volatile than their value-weighted counterparts. There are two reasons for this. Firstly, equally weighting the firms in an index gives more weight to the small firms, and it is a documented anomaly that small firms are characterized by higher returns than large firms (see, for example, Banz (1981) and Reinganum (1981)). Secondly, it reflects the gains from the semi-active equal-weighting scheme over the completely passive value-weighting scheme.

The second set of benchmarks is exactly the same as when the universe is the value-weighted industry indices; that is, they are the portfolios denoted

V2-V20. Finally, the third benchmark considered for this universe is an equally weighted portfolio of the equal-weighted industry indices[52] levered up and down. These are what we call the semi-passive strategies. We label these benchmarks E2-E20 and are also shown in Table 2. As with the portfolios V2-V20, the benchmarks E2-E20 have the same mnemonic feature, and the margin restrictions applicable to V12-V20 also apply equally to E12-E20.

[52] Equally weighting the equal-weighted industry indices will not give us the CRSP equal-weighted index. The reason for this is that our criteria for the inclusion of a stock in the index is stricter than what CRSP uses. CRSP includes ADRs and firms with missing share values while we exclude them so that both our equally weighted and value-weighted industry indices will be constructed from an identical universe of firms.

VI. The Results: Portfolio Returns and Compositions

This Chapter presents the results when multiperiod portfolio theory is applied to industry rotation for the period 1934-86. We describe the portfolio returns and compositions of a base case. This base case was described in Chapters I and IV, and is briefly restated below. We then make comparisons and note the differences between the base case and the other cases described in Chapter IV. This Chapter is divided into five major sections, A - D. Section A examines the portfolio returns of the active strategies of the base case, and compares these returns with the returns of benchmark portfolios. Section B compares the portfolio returns of the active strategies of the base case with those of the other cases. Section C describes the portfolio compositions of the active strategies of the base case. Finally, Section D contains a comparison of portfolio compositions of the base case versus the other cases. Each of the Sections A - D is further divided into several sub-sections, that include concluding remarks that summarize the results of each section.

A. Portfolio Returns: The Base Case

The base case is when the power utility functions, with and without leverage opportunities, manage either the twelve equal- or value-weighted industry investment universe using a 32 quarter simple probability assessment approach to estimate the joint return distribution. We present this base case scenario for the periods 1934-86 and 1966-86 in two tables and four figures, a description of which now follows.

Tables 3a-b present the geometric means and standard deviations[53] of $\ln(1+r_t)$ for each of the twelve equal-weighted industries and riskless lending for 10 active strategies corresponding to the γ's in equation (4), Chapter II, ranging from -75 (extremely risk averse) to 1 (risk neutral) when leverage opportunities are present (Table 3a) and when they are not (Table 3b); for the semi-passive benchmark portfolios which up- and down-lever an equally weighted portfolio of the equally weighted industries (E2-E20); as well as for the passive benchmark portfolios which up- and down-lever the CRSP value-weighted index (V2-V20) for the full 1934-86 period and the 1966-86 sub-period.[54] Figures 1a and 1b are the graphical equivalents of Table 3a, columns 1-2 and 3-4 respectively, while Figures 1c and 1d portray the first two and last two columns, respectively, of Table 3b. The following symbols are employed in Figures 1a-d: (i) the industries and riskless lending - squares; (ii) the 10 active strategies - circles; (iii) the semi-passive benchmark portfolios - diamonds; and, (iv) the passive benchmark portfolios - triangles. We also include the U.S. inflation rate (square) as a horizontal dashed line. Table 2 presents the notation used in labelling the industries and the semi-passive and passive benchmark portfolios contained in all the figures.

Tables 4a-b are the equivalents of Tables 3a-b when the investment universe is the value-weighted industries. Figures 2a-b portray the data contained in Table 4a and Figures 2c-d portray the data contained in Table 4b in the same fashion that Figures 1a-b and 1c-d represent the data contained

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[53] This measure is approximately the same as the standard deviation of rates of return for levels below 25%.
[54] Chapter V detailed the construction of these semi-passive and passive benchmark portfolios.

in Tables 3a and 3b respectively. The notation and symbols used are identical in all figures. The only difference is the absence of the semi-passive benchmark portfolios in both Tables 4a-b and Figures 2a-d.

We now proceed to examine the portfolio returns of the active strategies of the base case, making comparisons with the benchmark portfolios when necessary. This section contains six sub-sections.

1. The Investment Universes

A comparison of the industry returns shows that, for both the 1934-86 and 1966-86 periods, the mean returns from equal-weighting the industries (Table 3a) are consistently higher than the mean returns obtained by value-weighting them (Table 4a). This phenomenon almost surely reflects (i) the small firm effect, and, (ii) the "active" nature of equal-weighting versus passive value-weighting.[55] Among the equally weighted industries in the 1934-86 period, Services had the highest geometric mean (16.40%) and standard deviation (32.39%) while Utilities had the lowest geometric mean (13.22%). Among the value-weighted industries, Services again topped the list with a mean of 12.75% and standard deviation of 31.39%, while Transportation provided the lowest mean return (9.31%). During the 1966-86 sub-period, of the equal-weighted industries, we find Food and Tobacco had the highest mean return (16.02%) and Transportation had the lowest at 10.97%. For this same period, among the value-weighted industries, Food and Tobacco again came out on top with 12.96% while Transportation earned a meagre 7.03%; even Treasury bills earned 7.49%, and with much less variability.

2. The Leverage Case: 1934-86

[55]Chapter V contains a discussion of this phenomenon.

Comparing the active strategies contained in the first two columns of Table 3a with those in the first two columns of Table 4a, we find very different geometric mean returns when the powers manage the equal- *vis-a-vis* the value-weighted industries. The highest geometric mean return for the active strategies was 18.28% attained by the logarithmic investor when managing the equally weighted industries (see Table 3a) compared to 13.95% for the power 0.5 investor managing the value-weighted universe (see Table 4a). Except for the very risk averse investors (powers -75 to -30), the strategies employing the equal-weighted industries always outperformed their counterparts managing the value-weighted industries with about the same variability.[56]

Turning to the benchmark portfolios in the first two columns of Table 3a, we find that in moving from a passive strategy (portfolios V2-V20) to a semi-passive one (portfolios E2-E20), there was a dramatic improvement in geometric mean returns at the expense of only a slight increase in variability. Comparing the active strategies to these benchmarks, we find the following results: (i) when the universe was the equal-weighted industries (see columns 1-2 of Table 3a and Figure 1a), the more risk averse active strategies did slightly worse than the passive and semi-passive strategies; while the results for the more risk tolerant active strategies were mixed. Powers 0.5 and 1 clearly outperformed the passive benchmarks (albeit with a higher variability), while powers 0, -2 and -5 had higher geometric mean returns than the comparable passive strategies. The active strategies at

[56]While these highly risk averse powers had slightly lower returns when managing the equal- versus the value-weighted industries, they compensated by having lower standard deviations.

times outperformed the semi-passive strategies, and vice versa. (ii) When the value-weighted industries were the universe, the active strategies performed slightly worse than the passive benchmarks (see columns 1-2 of Table 4a and Figure 2a).

3. The Leverage Case: 1966-86

Columns 3-4 in Table 3a contain the results from managing the equal-weighted industries for the 1966-86 sub-period. The logarithmic policy, with a geometric mean return of 19.05%, was clearly ahead of the other active strategies and the benchmark portfolios. With approximately the same variability, the semi-passive E14 and E16 benchmark portfolios earned only 13.95% and 14.10% respectively; the passive strategy V20 earned only 7.15%; and the Services industry realized 14.22%. Moreover, all the active strategies outperformed the corresponding passive benchmark portfolios. Not only that, the semi-passive strategies clearly outdistanced their passive counterparts, but not to the same extent as the active strategies. The more risk averse powers (-75 to -5) performed about the same as the corresponding semi-passive benchmark portfolios while the less risk averse powers surpassed the comparable semi-passive results. These results are shown in a graphic form in Figure 1b.

Turning to the last two columns of Table 4a and Figure 2b, the results of the active strategies managing the value-weighted industries, while more muted, are still relatively good. The -2 power had the highest geometric mean return (11.31%), which surpassed the corresponding (V12) passive benchmark portfolio (8.77%). Moreover, all the active strategies, with the exception of the risk neutral investor, had higher mean returns than the corresponding passive strategies with equal variability. However, these active strategies did not all exceed the industry categories.

4. The No Leverage Case: 1934-86

Turning to the first two columns of Tables 3b and the corresponding graph, Figure 1c, we find that when the universe was the equal-weighted industries, the active strategies had mixed results. The lower powers (-75 to -30) slightly underperformed their passive and semi-passive counterparts; the higher powers (-15 to 1) did about the same or better than the passive benchmarks, and were only slightly worse than the semi-passive benchmarks.

When we examine columns 1-2 of Table 4b and Figure 2c, we find that the comparative passive strategies outperformed the active strategies managing the value-weighted industries. Only the Construction and Transportation industries had a lower geometric mean return than the active strategies.

5. The No Leverage Case: 1966-86

During this time period, the active strategies performed relatively well. The logarithmic investor had a geometric mean of 15.14% (highest) when the industries were equally weighted while the power -2 investor did the best (10.61%) managing the value-weighted industries.

Examining columns 3-4 of Table 3b and Figure 1d, we find that all the active strategies, when managing the equal-weighted industries, outperformed the comparative passive benchmarks, while only the less risk averse investors did better than the corresponding semi-passive strategies; the lower powers performed about the same as the equivalent semi-passive portfolios. With the exception of only the Food industry, the active strategies were distinctly north-west of the industry categories in return-standard deviation space.

Turning now to Table 4b (columns 3-4) and Figure 2d, we find the results relatively good. The -2 power managing the value-weighted industries earned

10.61% (highest) compared to the passive benchmark V10's 9.38% with about the same standard deviation. Overall, the powers from -75 to -2 had geometric means greater than their passive benchmark counterparts, while the risk neutral to logarithmic investors performed substantially worse than the passive strategies.

6. Concluding Remarks

When we compare the no leverage results with those when leverage opportunities were present, we find a salutary effect when margin purchases were permitted. For example, when the equal-weighted industries were the universe, the logarithmic investor earned "only" 13.84% for the 1934-86 period compared with 18.28% when margin purchases were permitted. This effect was evident in both the 1934-86 and 1966-86 periods, and whether the industries were equal- or value-weighted. However, this was evident only for the more risk tolerant strategies because for the highly risk averse investors (powers -75 to -30), the existence of leverage opportunities made no difference to their portfolio choices.

The principal findings for the base case scenario then are: (i) there are substantial gains to be had from applying the multiperiod portfolio model to active industry rotation, particularly when managing an equal-weighted industry universe. This was especially evident during the 1966-86 sub-period. (ii) The presence of leverage opportunities generally enhanced the portfolio returns of the more risk tolerant investors. (iii) The simple probability assessment approach is not without merit, producing good results when compared to the passive and semi-passive benchmark portfolios. The use of (only) historical returns to forecast next period's joint return distribution, in conjunction with the multiperiod portfolio model, obtained results that deal a damaging blow to the existence of weak-form efficient markets. (iv) The multiperiod portfolio model appears to be robust when extended beyond the asset allocation stage to a more micro level. Overall, the conclusions reached here with respect to the twelve-industry universe are consistent with the results of the Grauer-Hakansson studies on active asset allocation.

B. Portfolio Returns: The Base Case versus The Other Cases

We now examine the portfolio returns of the active strategies under various joint return distribution estimation techniques and with different sized industry investment universes. In particular, we focus on the differences in portfolio returns between these other cases and our base case and the benchmark portfolios. This section contains seven sub-sections.

1. A Simple Probability Assessment Approach: 8 and 24 Industries

We examine the effect that investment universe size has on portfolio returns. Specifically, we consider a contraction from twelve industries to eight and an expansion to twenty-four. For these investment universes, we estimate the joint return distribution by the simple probability assessment approach using the last 32 quarters of realized returns.

Tables 5a-d present the geometric means and standard deviations of the portfolio returns of the active strategies managing the eight industry universe; of the benchmark portfolios; and of the industries themselves for the periods 1934-86 and 1966-86. Tables 5a-b (5c-d) contain the results when the industries are equal-weighted (value-weighted), with and without leverage opportunities, respectively. Each of the Tables 5a-d have the results for the 1934-86 period in columns 1-2 and for the 1966-86 sub-period in columns 3-4.

Tables 6a-d, which are constructed in a parallel fashion to Tables 5a-d, present the results when the universe is twenty-four industries.

1a. The Eight Industry Universe

Consider the equally weighted eight industry universe when leverage opportunities are present (Table 5a). For the period 1934-86 (columns 1-2), we find mixed results for the active strategies when compared with the benchmarks. The lower powers (-75 to -10) did slightly worse than their passive and semi-passive counterparts; the middle powers (-5 to 0) performed as well as or better than the benchmarks, while the high powers clearly did worse than the semi-passive strategies. A comparison with columns 1-2 of Table 3a (the base case) shows that the active strategies managing an eight industry universe had lower geometric mean returns, but this was compensated for by lower variability. On the whole, there was practically no difference for the more risk averse investors. On the other hand, the logarithmic policy earned 16.93% managing eight industries versus 18.28% managing twelve industries; the risk neutral had geometric means of 14.07% versus 16.91%; the power 0.5 investor earned 15.86% versus 18.01%. Surely such differences in mean returns over a 53 year period have economic significance. For example, in following the logarithmic policy, an 18.28% annual return implies that $1 invested at the beginning of 1934 grows to $7316 by the end of 1986, while an annual return of 16.93% results in $3982.[57]

For the same universe, the 1966-86 period (Table 5a, columns 3-4) produced about the same results as in the 1934-86 period. All the active strategies managing the twelve industry universe had higher mean returns than from

[57]Whether the difference is statistically significant will be examined in Chapter VII.

managing the eight industry universe. Again, there were only marginal differences for the lower powers, while the higher powers displayed less difference than in the full period. With this eight industry universe, all the active strategies outperformed their corresponding passive benchmark portfolios, and with the exception of powers 0.5 and 1, also had higher mean returns than the semi-passive strategies.

On removing the leverage opportunities, the active strategies managing the eight equal-weighted industries (Table 5b) had virtually identical results as when they managed the twelve equal-weighted industries (Table 3b) for both periods.

Now consider the value-weighted eight industry universe with leverage opportunities present (Table 5c). The more risk averse investors (powers -75 to -2) in the 1934-86 period (columns 1-2) slightly underperformed the corresponding passive strategies, while the rest of the active strategies did much worse. Comparing this to the twelve value-weighted industry universe (Table 4a, columns 1-2), we find that the geometric mean returns were about the same for the lower powers. The "superiority" of managing the twelve industry universe was apparent for the logarithmic to the risk neutral investors. For example, the power 0.5 investor managing the twelve value-weighted industries earned 13.95% per annum over the 53 year period compared to 10.91% when the universe is eight industries. This is equivalent to investing $1 in 1934 and having $1014 versus $242 at the end of 1986. Surely this is economically significant.

For the 1966-86 period with the same investment universe (Table 5c, columns 3-4), we find the less risk averse active strategies being outperformed by the passive strategies while the other active strategies q

managed to earn about the same as the passive benchmarks. However, when we compare these results to those of the active strategies managing twelve industries (Tables 4a, columns 3-4), we find fairly large differences, especially for the less risk averse investors (except for the risk neutral investor).

In the no leverage case for the value-weighted industries, we find the active strategies had lower geometric means than their corresponding passive benchmarks for both the full 1934-86 period (Table 5d, columns 1-2) and 1966-86 sub-period (Table 5d, columns 3-4). All the active strategies managing twelve industries, except for the risk-neutral in the 1966-86 sub-period, outperformed their active counterparts managing eight industries (Table 4b versus Table 5d).

1b. The Twenty-four Industry Universe

Tables 6a-d present the results when the active strategies manage the twenty-four industry universe. Consider first the equal-weighted industry universe when leverage is available. For the 1934-86 period (Table 6a, columns 1-2), we see that the active strategies had lower geometric means than the corresponding semi-passive strategies, except for powers -2 and 0 which performed about as well. For the 1966-86 sub-period, (see Table 6a, columns 3-4), all the powers from -75 to -2 did well relative to the passive and semi-passive benchmarks. Only the Tobacco industry managed to generate a higher geometric mean than the best the active strategies could muster. The higher powers did relatively poorly, with the risk neutral losing money.

When we compare with the active strategies managing twelve industries, we find that powers -75 to -2 managing twenty-four industries had higher returns than when managing twelve industries for both the 1934-86 and 1966-86 periods

(Tables 6a versus 3a). However, the reverse was true for powers 0 to 1, with quite large differences. There is certainly economic significance here.

The results with no leverage opportunities, for both periods, are given in Table 6b. The more risk averse investors (powers -75 to -10) performed about the same whether leverage was available or not. The higher powers were clearly liberal users of leverage when available, so that removing such opportunities lowered their mean returns, except for the risk neutral investor in both periods and the power 0.5 investor in the 1966-86 period. Comparing Table 6b with Table 3b (the twelve industry universe), we find the full period mean returns (columns 1-2) to be comparable while for the sub-period 1966-86 (columns 3-4), the higher powers managing the twelve industry universe clearly outperformed their counterparts managing twenty-four industries. For example, power 0 earned 15.14% versus 9.27% with comparable variability; power 0.5 earned 14.88% versus 5.41%; and 14.42% versus 2.57% for the risk neutral investor.

Turning to the twenty-four value-weighted industries, the active strategies, regardless of whether leverage was available or not, performed relatively poorly in the 1934-86 period compared to the passive benchmark portfolios (see columns 1-2 of Tables 6c and 6d). For the lower powers, the size of the universe did not matter. The higher powers (1 to -2) had higher geometric means managing the twelve industry universe (Tables 4a-b, columns 1-2) than the twenty-four industry universe (Tables 6c-d, columns 1-2); the differences were particularly acute in the leverage case. For example, power 0 earned 13.61% with leverage while managing twelve industries compared to 7.51% managing twenty-four industries, and at the same time had lower variability.

For the 1966-86 period (Tables 6c-d, columns 3-4), only the lower powers managed to do as well as the passive benchmarks (leverage did not matter for these powers). Nevertheless, the active strategies managing twelve industries (Tables 4a-b, columns 3-4) did outperform their counterparts managing the twenty-four industry universe (Tables 6c-d, columns 3-4).

Summarizing, we find that: (i) the active strategies did better when managing equal- rather than value-weighted strategies, regardless of the size of the investment universe; (ii) the results for the sub-period 1966-86 were usually better than for the full period, especially when managing the equal-weighted industries; (iii) the use of leverage, when available, tended to enhance the portfolio returns of the less risk averse investors, but at the expense of higher variability; (iv) there were economically significant differences, especially for the higher powers, when managing different sized investment universes. In particular, the less risk averse active strategies managing twelve industries almost always did better than their counterparts managing either the eight or twenty-four industries. The differences were especially sharp when leverage opportunities were available. For the lower powers, there was almost no difference whatever the size of the investment universe. An explanation for this is that these investors hardly ever employed leverage when it was available, and they always had a large proportion of their funds in the riskfree asset. Thus, the variation in their portfolio returns is not (mostly) attributable to the variation in the industries invested, but rather primarily from the variability of the riskfree rate over time.

2. 12 Industries: A 28 and 40 Quarter Simple Probability Assessment Approach

We now examine the portfolio returns when different amounts of realized returns are used to estimate the joint return distribution for the next period. For the base case, which employed the most recent 32 quarters of realized returns to estimate the joint return distribution, we found the results to be most respectable. Now we examine the effects on portfolio returns when the estimating period is 28 and 40 quarters.

Tables 7a-b give the results for the active strategies managing the twelve equal-weighted industries, with leverage opportunities, for the 1936-86 and 1966-86 periods,[58] respectively, when the most recent 32, 28 and 40 quarters (columns 1-2, 3-4 and 5-6 respectively) of realized returns are employed to estimate the joint return distribution. Tables 7c-d present the results for the 1936-86 and 1966-86 periods when leverage is not permitted, and are constructed to parallel Tables 7a-b. Finally, Tables 8a-d are the equivalents of Tables 7a-d when the twelve value-weighted industries are the investment universe.

2a. The 28 Quarter Estimating Period

When the equal-weighted industries were the universe, we find that in moving from a 32 to a 28 quarter estimating period, the geometric means of all the active strategies decreased in the 1966-86 period (except for the risk neutral investor with leverage present), whether leverage was present or not (columns 1-2 versus 3-4 in each of Tables 7b and 7d). Furthermore, most of the active strategies had higher variability; with no leverage (see

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[58] Note that if 40 quarters of realized returns are use to estimate the joint return distribution, then the first quarter for which a portfolio can be selected is the first quarter of 1936. This is because the period 1926-35 inclusive is required to estimate the joint return distribution. Note that the earliest date for which we have data is the first quarter of 1926. Thus, for comparison purposes, we report portfolio returns only the period from 1936 on for the 28 and 32 quarter simple probability assessment approaches.

Table 7d), all standard deviations except for power 0 went up, and with leverage (see Table 7b), only powers 0.5 and 1 had lower variability. For the 1936-86 period, all the standard deviations increased when using a 28 quarter *vis-a-vis* a 32 quarter estimating period (see Tables 7a and 7c), regardless of leverage opportunities. The direction of change in the geometric means were mixed. Generally, the lower powers (-75 to -5) and the risk neutral investor attained higher mean returns to compensate for the increased variability.

Turning to Tables 8a-d, columns 3-4 (28 quarter) compared with columns 1-2 of each table reveals that, with a universe of the twelve value-weighted industries, the standard deviations of the lower powers (-75 to -5) increased while they decreased for powers 0 and up. This occurred for both periods, irrespective of whether leverage was permitted or not. The geometric mean returns, however, did not have the same consistency. They went up, usually for the lower powers, in the full 1936-86 period, but decreased, again for the lower powers, in the 1966-86 sub-period. For the more risk tolerant strategies (powers 0 to 1), the mean returns increased, when margin purchases were not permitted, in both periods (see Tables 8c-d). When leverage was allowed, these powers, except for the risk neutral, had their returns go down (see Tables 8a-b) in both periods.

To summarize, we generally found that going from a 32 to a 28 quarter estimating period for both the equal- and value-weighted industries, with or without leverage, resulted in: (i) higher standard deviations (usually) for the lower powers in both periods, and mixed changes for the others; and, (ii) higher geometric means for the more risk averse strategies in the 1936-86 period, and lower mean returns for most powers in the 1966-86 sub-period.

Thus, decreasing from a 32 quarter to a 28 quarter estimating period produced consistent changes (i.e., up or down) in the geometric means and standard deviations for the more risk averse strategies, while the higher powers had more erratic results.

2b. The 40 Quarter Estimating Period

The use of 40, rather than 32, quarters of realized returns to estimate the joint return distribution produced some consistent results. Comparing columns 5-6 with columns 1-2 of each of the Tables 7a, 7c and 8a, 8c show that for the full period 1936-86, all the active strategies attained lower standard deviations accompanied by lower geometric means. The exception was the risk neutral investor. In the 1966-86 sub-period (see Tables 7b, 7d and 8b, 8d, columns 5-6 versus columns 1-2), we found lower geometric means for all investors, except for the risk neutral investor. However, the variability of portfolio returns declined as well to compensate. The exception occurred when the equal-weighted industries were the universe; for the risk neutral investor regardless of leverage, and when the power 0.5 investor employed leverage . Thus, changing from a 32 to a 40 quarter estimating period produced less erratic changes in the geometric means and standard deviations of the active strategies when compared with changing to a 28 quarter estimating period.

In summary, the differences for the more risk averse strategies were relatively minor, while the more risk tolerant strategies produced economically, if not statistically, significant differences. For example, in the 1936-86 period, the logarithmic investor managing the equal-weighted industries with leverage opportunities available earned 18.07%, 15.85% and 16.01% with about the same variability when 32, 28 and 40 quarters were the estimating periods respectively. The difference over this 51 year period is equivalent to investing $1 at the beginning and realizing $4777, $1814 and $1947 respectively at the end of 1986. This must be economically significant, and bodes well for the 32 quarter estimating period.

3. 12 Industries: A Simple Probability Assessment Approach with an Inflation Adapter

The first two columns of Tables 9a-d give the results when the simple probability assessment approach with an inflation adapter is used to estimate the joint return distribution. The estimation period is 32 quarters and the universe is the twelve equal-weighted industries. The leverage case for the periods 1934-86 and 1966-86 is shown in Tables 9a and 9b respectively, while Tables 9c and 9d shows the no leverage case for the periods 1934-86 and 1966-86, respectively. Tables 10a-d, columns 1-2, present the results when the twelve value-weighted industries are the universe and parallel columns 1-2 of Tables 9a-d.

3a. The Equal-Weighted Industries

The results for the 1934-86 period when leverage was permitted were mixed; the first two columns of Tables 9a and 3a show that for the low to middle powers, the inflation adapter method clearly enhanced geometric mean returns and reduced variability at the same time. For example, the -2 power earned 13.86% with a standard deviation of 21.32% under the simple probability assessment approach compared with the 14.24% and a lower variability (19.67%) with the inflation adapter. The higher powers (0 to 1) performed slightly worse with this method, but they compensated by having lower variability. Thus, the power policies with the inflation adapter, will shift slightly in the north-westerly direction from their present positions in Figure 1a.

Turning to the 1966-86 sub-period with leverage permitted, columns 1-2 of Table 9b show respectable results for the active strategies. They clearly earned higher mean returns than their passive and semi-passive counterparts. For example, the logarithmic investor earned 15.84% compared to V14's 8.43% and V16's 8.12%, and to E10's 13.75%. The industries themselves as portfolios did not fare any better. Only the Food industry managed to outperform the active strategies. Comparing with Table 3a (columns 3-4), we find the inflation adapter method reduced the variability of the active strategies quite significantly over the simple assessment approach, at expense of a slight reduction of geometric means. The exception is the logarithmic investor. The standard deviation for this investor was reduced from 33.36% to 25.37%, with a drop in geometric mean from 19.05% to 15.84%.

With no leverage opportunities, the results of periods 1934-86 and 1966-86 (see Tables 9c and 9d respectively) were quite similar to the results from the simple probability assessment approach (Table 3b, columns 1-2 and 3-4 respectively). The recurring result was the reduction in variability of the portfolio returns of the active strategies with the inflation adapter method at the (mostly) slight expense of lower geometric mean returns.

3b. The Value-Weighted Industries

Turning to Tables 10a-d (columns 1-2) and comparing with Tables 4a-b (all columns), we find the following with respect to the inflation adapter method versus the simple probability assessment approach when the investment universe is the twelve value-weighted industries: (i) the variability of the portfolio returns of all active strategies decreased in both periods regardless of leverage opportunities. The comparison is columns 1-2 of

Tables 10a, 10b, 10c, and 10d against Table 4a, columns 1-2 and 3-4, and Table 4b, columns 1-2 and 3-4, respectively. (ii) In the 1934-86 period, the geometric mean returns of the lower powers decreased slightly, but the less risk averse investors (powers -5 and up) experienced increased mean returns whether leverage was available or not (see Tables 10a and 10c, columns 1-2 versus Tables 4a and 4b, columns 1-2). (iii) The 1966-86 period saw dramatic increases in portfolio mean returns for all the active strategies, especially for the higher powers (see Tables 10b and 10d, columns 1-2 versus Tables 4a and 4b, columns 3-4). For example, with leverage (no leverage), the geometric mean of the logarithmic investor increased from 9.34% (8.23%) to 12.35% (10.41%) while decreasing the variability from 30.29% (23.87%) to 25.39% (18.67%); the risk neutral investor had the mean rise from 0.02% (3.85%) to 9.60% (10.25%) and the variability falling from 49.37% (33.66%) to 32.07% (19.16%).

To summarize, the inflation adapter method appears to slightly enhance the results of the simple probability assessment approach when managing the equal-weighted industries, and thus supporting the conclusions reached in *Section A*. A graphical representation of Tables 9a-d (columns 1-2) will be identical to Figures 1a-d (which represent the simple probability assessment approach) except that the power policies will now plot slightly more to the left. However, the active strategies managing the twelve value-weighted industries, with or without leverage, showed sharp increases in geometric mean returns during the 1966-86 sub-period, especially for the higher powers, while experiencing lower variability. Thus, the power policies in Figures 2c-d will show a significant north-westerly shift from their present position.

4. 12 Industries: A "Sum-of-the-Digits" Probability Assessment Approach

Columns 3-4 of Tables 9a-d and Tables 10a-d give the geometric mean returns and standard deviations of the "sum-of-the-digits" method to estimating the joint probabilities of the simple assessment approach. We utilize the last 32 quarters of realized returns and assign the probabilities to each joint realization according to the "sum-of-the-digits" rule, with the most recent observations having the higher probabilities of occurrence than the earlier obserations.[59]

Specifically, columns 3-4 of Tables 9a-b and 9c-d present the results when the active strategies manage the twelve equal-weighted industries for the 1934-86 and 1966-86 periods, with and without leverage, respectively. Columns 3-4 of Tables 10a-b and 10c-d parallel columns 3-4 of Tables 9a-b and 9c-d except that the universe is now the twelve value-weighted industries.

4a. The Equal-Weighted Industries

Comparing columns 3-4 of Tables 9a-b and 9c-d with Tables 3 (columns 1-2 and 3-4) and Table 3b (columns 1-2 and 3-4) respectively, reveal that the standard deviations of portfolio returns of the active strategies employing this "sum-of-the-digits" probability assignment increased (marginally) over the simple probability assessment approach. The exceptions were the risk neutral investor, and occasionally the 0.5 power and logarithmic investor. This occurred for both the 1934-86 and 1966-86 time periods, and for when leverage opportunities were present and when they were not. However, accompanying these increases in variability were increases in the geometric mean returns, but not always. Specifically, during 1934-86 and with leverage,

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[59] This technique was described in Chapter IV.

powers 0 and 0.5 had lower geometric means, but higher variabilities (see Table 9a, columns 3-4 versus Table 3a, columns 1-2); similarly for 1966-86 and with leverage, powers -2 to 0.5 also had lower means (see Table 9b, columns 3-4 versus Table 3a, columns 3-4). When leverage was not present, powers -2 and 0 earned lower returns for the 1934-86 period (see Table 9c, columns 3-4 versus Table 3b, columns 1-2), while during 1966-86, powers -2 to 0.5 had decreased geometric means (see Table 9d, columns 3-4 versus Table 3b, columns 3-4).

4b. The Value-Weighted Industries

The results for the active strategies managing value-weighted industries were mixed. Turning to Tables 10a-d and Tables 4a-b, we find the results almost identical as when the equal-weighted industries were the universe. Specifically, for the 1934-86 with leverage opportunities present, all the standard deviations of the active strategies were slightly higher than when the simple probability assessment approach was used (columns 3-4 of Table 10a versus Table 4a, columns 1-2). Furthermore, only the geometric mean returns of powers -75 to -2 increased to offset the increased variability. For the 1966-86 sub-period with leverage, all standard deviations, except for the risk-neutral investor, increased while the geometric means changes were mixed; powers -75 to -10, 0.5 and 1 increased (see columns 3-4 of Table 10b versus Table 4a, columns 3-4). The no leverage results almost mirror the leverage ones. For the 1934-86 period, all active strategies except for powers 0.5 and 1 had higher variability, while the geometric means only decreased for powers -2 and 0 (columns 3-4 of Table 10c versus columns 1-2 of Table 4b). Finally, only the geometric means of powers -5 and -2 decreased in the 1966-86 period when all the moderate to low powers (-2 to -75) had higher standard deviations (Table 10d, columns 3-4 versus Table 4b, columns 3-4).

In summary, the "sum-of-the-digits" method to assigning probabilities in the simple assessment approach had marginal effects on the active strategies' portfolio geometric means and variabilities. Most of the time, the standard deviations increased compared to the simple probability assessment approach, but they were usually tempered by increases in geometric means as well. Moreover, for the low powers, the increases in standard deviations were slight while their geometric means increased marginally more.

5. 12 Industries: An "All-of-History" Probability Assessment Approach

Columns 5 and 6 of Tables 9a-d and 10a-d present the "all-of-history" approach to estimating next period's joint return distribution. The initial number of realized returns used to begin this estimation is the first 32 quarters of data (this is the same as the start up point of the base case). We assign equal probabilities to each joint realization so that as we move forward in time, each realized state is assigned a lower and lower probability of occurrence in the next quarter.

Columns 5-6 of Tables 9a and 9b present the results when the active strategies manage the twelve equal-weighted industry universe, with margin purchases permitted, for the periods 1934-86 and 1966-86 respectively. The no leverage case is shown in columns 5-6 of Tables 9c and 9d for the same respective time periods. Columns 5-6 of Tables 10a-d parallel Tables 9a-d, columns 5-6, except that they show results when the universe is the twelve value-weighted industries.

5a. The Equal-Weighted Industries

Comparing Tables 3a-b with Tables 9a-d (columns 5 and 6), we find that employing the "all-of-history" method made the active strategies more conservative in their portfolio selection relative to the simple probability assessment approach as evidenced by comparing the geometric mean returns and standard deviations in the Tables. When the equal-weighted industries were the universe (columns 5-6 of Tables 9a-d), all the active strategies had lower mean returns than with the simple probability assessment approach, but this was offset by lower standard deviations. This occurred in both the 1934-86 (columns 5-6 of Tables 9a and 9c)and 1966-86 (columns 5-6 of Tables 9b and 9d) periods regardless of whether leverage opportunities were present or not. Furthermore, the powers -75 to -2 had standard deviations below 10%, but the variability for the other powers start above 20% (see Tables 9a-d, columns 5-6). These lower powers, regardless of leverage opportunities, performed about the same as the semi-passive, and slightly better than the passive strategies in the 1934-86 period (Tables 9a and 9c, columns 5-6). For the 1966-86 period, these same active strategies clearly outperformed the passive benchmarks and barely outearned the semi-passive strategies (see Tables 9b and 9d, columns 5-6).

5b. The Value-Weighted Industries

For this universe (see Tables 10a-d, columns 5-6), we find about the same effects on the active strategies as in the equal-weighted universe case. Specifically, the standard deviations of all active strategies decreased, but not all geometric means declined at the same time. Only for the 1934-86 period with no margin purchases permitted did all mean returns also decrease (see columns 5-6 of Table 10c versus columns 1-2 of Table 4b), while with leverage, only the risk-neutral had a higher geometric mean than before (see Table 10a, columns 5-6 versus columns 1-2 of Table 4a). For the 1966-86 sub-period, powers 0 and 1 increased their geometric means when leverage was available (see Table 10b, columns 5-6 versus columns 3-4 of Table 4a), together with power 0.5 when it was not (see Table 10d, columns 5-6 versus columns 3-4 of Table 4b). Thus, we see that for the 1934-86 period, the lower powers (-75 to -2) performed about the same as the passive benchmarks whereas before it underperformed. Moreover, the rest of the powers, while still performing worse than the benchmarks, did better than before; i.e., underperformed less. The results for the 1966-86 sub-period show that these lower powers still did better than the corresponding passive strategies, but the higher powers now did worse when leverage was present. Without leverage during the same time frame, the higher powers were more respectable (i.e., did not underperform the benchmarks as much as before) while the lower powers managed to outearn their respective passive benchmark portfolios.

By way of summary, there may be some merit to the "all-of-history" method of estimating the joint return distribution. It certainly is a means of reducing the standard deviation of portfolio returns, but at the expense of a lower geometric mean return. For the less risk averse investors, the method is an "improvement" over the simple probability assessment approach in that their returns went up while their variability went down when managing the value-weighted industries.

6. 12 Industries: A "Disaster States" Probability Assessment Approach

We present the "disaster states scenario" in Tables 11a-d and 12a-d. We quickly review this scenario: basically we use the 32 quarter estimating period simple probability assessment approach as the initial starting point; then we add in the worst previous state of joint returns of each industry to the joint distribution of realized returns. Thus we add in an extra 12 states since we considered the twelve industry investment universe. The way that the probabilities are assigned to the states was given in Chapter IV. We review it quickly here.

There are 32 "normal" states consisting of the most recent 32 quarters of joint realized returns. There are also 12 "disaster" states. The parameter J is an integer that varies between 1 and 12; i.e., $1 \le J \le 12$ and is used to vary the probabilities assigned to each "normal" state and each "disaster" state. The formulas are:

Probability of each normal state = $1/(32+J)$, and

Probability of each disaster state = $J/(32+J)\cdot 12$,

for $1 \le J \le 12$. We examine three cases: we set J=1,6, and 12. Notice that this formula is quite general. If we let J=0, then we are back to the simple probability assessment approach since the "disaster states" are assigned a zero probability of occurrence. When J=12, then each "normal" state and each "disaster state" has a probability of 1/44 of occurrence. When J=6, then each "normal" state is assigned 1/38 probability and each "disaster state" has $6/(12\cdot 38)$ probability of occurrence. Finally, when J=1, the "normal" states each has probability 1/33 while the "disaster states" are each given $1/(12\cdot 38)$. Thus, the "disaster states" are assigned decreasing probabilities of occurrence when J goes from 12 to 1.

Tables 11a and 11b present the results when the active strategies manage the twelve equal-weighted industries with leverage permitted for the periods 1934-86 and 1966-86 respectively. Tables 11c and 11d are like Tables 11a and 11b, except that leverage is not permitted. Columns 1-2, 3-4 and 5-6 of each of the Tables 11a-d describe the case when J=1,6, and 12 respectively. Finally, Tables 12a-d present the results when the universe is the twelve value-weighted industries, and is constructed to parallel Tables 11a-d.

6a. "Disaster States" Scenario: J = 1

This scenario is shown in columns 1 and 2 of Tables 11a-d and 12a-d. Comparing with Tables 3a and 4a, we find lower expected returns and lower standard deviations for most active strategies for this scenario relative to the simple probability assessment approach. This is irrespective of leverage opportunities, whether the industries were equal- or value-weighted, and for both 1934-86 and 1966-86 periods. (Compare columns 1-2 of Tables 11a, 11b, 11c, and 11d with columns 1-2 and 3-4 of Table 3a and columns 1-2 and 3-4 of Table 3b, respectively. Make a similar respective comparison for Tables 12a-d and Tables 4a-b.)

More specifically, when the industries were equal-weighted, power 0.5 achieved higher returns in all cases (see Tables 11a-d columns 1-2 versus Table 3a, columns 1-2, 3-4 and Table 3b, columns 1-2, 3-4 respectively); power 1 had higher returns but also higher standard deviations in only the no leverage case (see Table 11c and 11d, columns 1-2 versus Table 3b columns 1-2 and 3-4 respectively). Thus, in this case, the lower powers consistently achieved lower geometric means and standard deviations, while the results for the higher powers were mixed (i.e., no consistent direction of change of the means and the standard deviations).

For the value-weighted industries, the results appear very similar to managing the equal-weighted industries. In general, most active strategies achieved lower returns *vis-a-vis* the simple probability assessment approach, while all active strategies had lower variability (compare columns 1-2 of Tables 12a, 12b, 12c and 12d with columns 1-2 and 3-4 of Table 4a and columns 1-2 and 3-4 of Table 4b, respectively). The risk neutral investor managed to attain higher returns in all cases, while the logarithmic investor had higher returns only during the 1966-86 period.

In summary, for the equal-weighted industries with leverage present, the results for the 1934-86 period were about the same as with the simple probability assessment approach, except that the power 0.5 managed to fare substantially better while the other powers were just marginally better. During the 1966-86 sub-period, the most dramatic improvement again came from the power 0.5, while the lower powers all had slightly better results. When leverage was not permitted, the lower powers achieved about the same results as the base case in the 1934-86 period. Again, only power 0.5 showed any substantial benefit from this disaster state scenario. For the 1966-86 sub-period, the logarithmic and power 0.5 investor achieved the most benefit from this scenario. When the value-weighted industries were the universe, there was hardly any change from the base case for the 1934-86 period with leverage. The only exception was the risk-neutral investor. Even then, this investor managed to close the underperformance gap only a little relative to the passive strategies. During 1966-86, only the risk-neutral and logarithmic investors showed any substantial improvement over their counterparts in the base case. The geometric mean for power 1 went up from 0.02% to 13.56% with a moderate decrease in variability. Surely there is economic significance, at least for this investor. Finally, when no leverage opportunities were present, improvements from the base case were almost non-existent for the active strategies during the 1934-86 period. Overall, the powers 0 to 1 mostly showed significant improvements from the base case; these three investors had higher geometric means and variability as a result of this "disaster state" scenario. The major inference drawn from this is that the less risk averse investors stand to benefit more than their more risk averse counterparts. This is because appending disaster states to the estimation distribution makes the distribution more conservative and hence contains the less risk averse investors' desire to take on risk.

6b. "Disaster States" Scenario: J = 6

This "disaster states" scenario is shown in Tables 11a-d and 12a-d, columns 3-4. Because we are assigning higher probabilities to each of the "disaster states", we expect to see more conservative results. This is borne out when we compare with Tables 3a-b and 4a-b.

Comparing columns 3-4 of Tables 11a, 11b, 11c and 11d with columns 1-2 and 3-4 of Table 3a and columns 1-2 and 3-4 of Table 3b, respectively, we find the following results. First, all the active strategies attained lower standard deviation, regardless of the time period, whether leverage was permitted or not, and irrespective of how the industries were weighted. Second, for the equal-weighted industries, all the powers had lower geometric mean returns. The only exception occurred in the 1966-86 sub-period with leverage for the risk neutral investor. Third, when the universe was the value-weighted industries, the more risk averse powers (-2 to -75) all experienced lower mean returns. Only the risk neutral investor managed to earn more in both periods, with and without leverage. The other higher powers attained mixed results.

Comparing the results with the passive and semi-passive benchmark portfolios, we find mixed results. Take the equal-weighted industries first. For the 1934-86 period with margin purchases permitted (Table 11a, columns 3-4), this method actually made the active strategies worse than with the simple probability assessment approach and therefore worse than the semi-passive and passive strategies. In the 1966-86 period, the relative performance was still good in that the active strategies certainly outperformed both benchmarks (see Table 11b, columns 3-4). Only the Food industry did better than the powers. When margin was not allowed, the active strategies in the 1934-86 period still underperformed the benchmarks (see Table 11c, columns 3-4), while for the 1966-86 sub-period they managed to do better (see Table 11d, columns 3-4).

When the value-weighted industries were the universe and leverage was available, the full period results had the powers being outperformed by all the benchmarks (see Table 12a, columns 3-4). The 1966-86 results (see Table 12b, columns 3-4) were better in the sense that (i) the powers had higher geometric returns than comparative passive benchmarks, and (ii) the powers plotted to the north-west of all the industries, with the possible exception of Food. When no leverage was allowed, the full period results remained similarly unchanged; i.e., comparative passive portfolios had higher geometric means (see Table 12c, columns 3-4). For the 1966-86 sub-period, the active portfolios plotted distinctly north-west of the industries and the passive benchmark portfolios (see Table 12d, columns 3-4).

6c. "Disaster States" Scenario: J = 12

The results for this scenario are shown in the last two columns of Tables 11a-d and 12a-d. Comparable results for the simple probability assessment case are in Table 3a-b and 4a-b. Since we are assigning each "disaster" state a probability equal to each "normal" state, we expect even more conservative performances than the previous "disaster states" scenarios.

A summary of the findings are: (i) all active strategies had lower standard deviations than the base case; and (ii) the geometric means were similarly decreased for the powers, save for power 1 in the 1966-86 period with no leverage. Just by looking at columns 5-6 of Tables 11a-d and 12a-d, this method assigned too high a probability to each of the "disaster states" in that there was little difference in the geometric means of the more and less risk averse strategies. This was beyond our original intention and motivation for introducing this type of scenario into our estimation process. Thus we can eliminate this particular scenario from any serious consideration in estimating the joint return distribution.

7. Concluding Remarks

The robustness of applying the multiperiod portfolio model to the reinvestment problem was examined. As a reference point, we chose the twelve industry universe with a 32 quarter estimating period simple probability assessment approach as our base case. We varied the size of the investment universe considered, from the twelve industry base to an eight and twenty-four industry universe while keeping the 32 quarter simple probability assessment approach to estimating the joint return distribution. Next, we examined a 28 and 40 quarter estimating period while retaining the twelve industry universe and the simple probability assessment approach. In all cases, we considered an equal- and a value-weighting construction of the industries, and with and without leverage opportunities present.

Our principal findings are (i) the more risk averse strategies performed about the same as the base case; (ii) the higher powers had a slight edge when the twelve industries were the investment universe; (iii) the higher powers managed slightly better performance with a 32 quarter estimating period. Nevertheless, the overall results were quite respectable regardless of which of the three estimating periods were utilized and whether the universe was eight, twelve or twenty-four industries; (iv) there were significant improvements when the no leverage constraint was removed, especially for the more risk tolerant investors during the 1966-86 sub-period; and (v) investors did better when managing an equal- weighted universe. Thus the simple probability assessment approach has much to recommend it. This concurs with, and reinforces, the conclusions found in the Grauer-Hakansson studies. Furthermore, the success of the simple probability assessment approach, which uses the past to (naively) forecast the future, in combination with the multiperiod portfolio model points to the non-existence of (even) weak-form efficient markets.

We further examined the efficacy of the simple probability assessment approach by presenting several methods by which to estimate next period's joint return distribution. As the first step, we replicated the inflation adapter to the simple probability assessment approach in Grauer-Hakansson (1988). Next, we drew upon the "common-sense" appeal found in univariate time series modelling. The idea here is that the future is more likely to be better modelled by the recent rather than the distant past. Hence, a first step in this direction is to assign more weight, by a "sum-of-the-digits" method, to the recent observations in the estimation of the joint return distribution. Noting that the methods described here so far represent a "moving window" approach to estimating the joint return distribution, we extend the analysis to consider an "all-of-history" approach. In other words, rather than just using the most recent N quarters, we supply all the realized returns to the model as the estimate of the return distribution. There is a different underlying assumption behind this approach. The "moving window" method assumes that the joint return distribution is not stationary while the "all-of-history" approach assumes it is. Finally, we note that the "moving window" approach completely ignores all returns "out of the window". Thus, an investor using this approach "pretends" that the fourth quarter of 1929 never happened if this period is out of the "window". However, the disaster of 1929 did occur and disasters like it may occur again. Thus, we modify the simple probability assessment approach by including "disaster states" to the estimated joint return distribution. We considered three scenarios, each assigning a different probability to the "disaster states". The purpose behind this method is to keep, in the investor's mind, the fact that disaster states did happen and may occur again.

The primary findings are as follows. (i) The inflation adapter to the simple probability assessment approach revealed that this method did not produce the same remarkable results of Grauer-Hakansson (1988). Specifically, when the equal-weighted industries were the universe, the inflation adapter made the more risk tolerant investors perform slightly worse than the simple probability assessment approach i.e., lower geometric means, but they also had correspondingly lower variability. The more risk averse strategies, however, showed improvements in both geometric means (higher) and standard deviations (lower). For the value-weighted industries, there were significant improvements, particularly in the 1966-86 period. The more risk averse active strategies performed about the same, but the higher powers clearly benefitted from this approach. However, these results are still not as dramatic as those in Grauer-Hakansson (1988). (ii) With the "sum-of-the-digits" approach, the results were generally mixed. For the equal- and value-weighted industries, the lower powers showed higher geometric means, but also higher variability, while the higher powers usually performed worse, i.e., lower returns and higher variability. (iii) The "all-of-history" approach had a sobering effect on the active strategies' standard deviations; they decreased, at times quite dramatically, but this was tempered by a decline in the geometric means. The less risk averse investors managing the value-weighted industries saw their mean returns rise and variability fall. Thus, this approach may have some merit. (iv) The "disaster states" scenario achieved the effect (intended or not) of making all investors more conservative in their portfolio selection. This was particularly evident when J=12 (i.e., assigning the "disaster states" the same probability as the "normal states"). The final judgement was that the J=12 scenario should be eliminated as an estimation approach. However, there may be some merit when J=1 in the "disaster states" scenario. This time the approach had the intended effect in that it subdued the investors desire for risk, but not to the extent of eliminating the equity market as an investment vehicle (unlike the case J=12). The striking effect was the (occasionally substantial) decline in the variability of the portfolio returns of the investors, trading off with a modest drop in the mean returns. This was particularly evident for the more risk tolerant strategies. Finally, in the case when J=6, we naturally find the results from this to be (mostly) in-between that of J=1 and J=12. We did find dramatic decreases in the variability with more modest declines in the geometric means. This was particularly evident when the twelve value-weighted industries were the universe and only for the 1966-86 period.

From an overall viewpoint, we have to return to the initial conclusion that the simple probability assessment approach has much to recommend it. However, each of the approaches considered here have their merits at times. For example, the inflation adapter approach performed quite well in the 1966-86 period. This is understandable as inflation only became a serious concern from the 1960's on. We did not expect this approach to have much effect in the earlier periods, and the results bear this out.

To complement the results from examining portfolio returns and standard deviations, we present the portfolio compositions of selected powers of the base case. We note the striking features of the power policies under each of the other cases, comparing with the base case compositions whenever necessary.

C. Portfolio Compositions: The Base Case

The base case consists of two sets of twelve industries (equal- and value-weighted), 10 active strategies, and 212 decision points in the period 1934-86. Moreover, there are both leverage and no leverage cases to consider. Thus we cannot report the investment policies in great detail. Instead, we focus on the policies of two active strategies, powers -15 and 0, noting the major trends contained in them,[60] and relate the investment policies of these two investors to the other eight.

Tables 13a and 13b report the investment policies of the active strategies for powers -15 and 0 respectively, for the full period 1934-86 when they manage the twelve equal-weighted industries with leverage opportunities present. For each power, column 1 shows the period, the second column reports the quarterly portfolio return, columns 3 and 4 show the

[60]Powers -15 and 0 were chosen for two reasons: (i) they are in the middle of the 10 powers; -15 is sufficiently risk averse for us to relate his policies with those of his more risk averse counterparts (-30 to -75) as well as to the -10 power. Power 0 is sufficiently risk tolerant so we can relate his policies to those around him, viz., power 0.5, -2 and -5. Besides, the logarithmic policy is interesting in its own right. (ii) The Graüer-Hakansson studies usually presented the portfolio compositions of these powers. This facilitates comparisons with their work.

proportion invested in the risk-free asset and the fraction in borrowing respectively, and the next twelve columns show the proportions invested in each of the twelve industry categories. The notation for the industries shown in these tables was previously presented in Table 2. Tables 14a-b are identical to Tables 13a-b except that margin purchases are not permitted. Finally, Tables 15a-b and 16a-b are the value-weighted industry universe counterparts of Tables 13a-b and 14a-b, respectively. All the Tables 13a-b through 16a-b are constructed in a parallel fashion.[61] Finally, summary statistics for the investment policies of all 10 powers are contained in Tables 17a-d. These tables show: the number of times an industry entered into the investors' portfolio (rows 1-12), the number of times the risk-free asset was an investment outlet (next row), how often margin purchases were made (next row), and the number of times the investor was completely in the equity market (next row). The next three rows give the maximum and minimum proportions invested in the risk-free asset as well as the number of quarters the portfolio earned negative returns. Finally, the last twelve rows depict the diversification of each investor, i.e., the number of times the investor invested in one industry, two industries, and so on.

1. The Equal-Weighted Industries

Tables 13a-b show the policies of two investors, powers -15 and 0, in the presence of leverage opportunities, for the 1934-86 period. The case with margin purchases not allowed is shown in Tables 14a-b. Summary statistics of all 10 power policies for this universe is contained in Tables 17a (leverage

[61]That is, the tables are numbered NNa-b, where NN is 13, 14, 15 or 16. The "a" following NN always refers to the power -15 investor and the logarithmic investor is always reported in "b".

case) and 17b (no leverage case).

Turning first to Table 13a, the leverage case, the power -15 investor made heavy use of the risk-free asset in his portfolio, lending continuously from 1934-1 to 1956-3 (i.e., from the first quarter of 1934 through to the third quarter of 1956), and again from 1962-3 to 1986-4. His investment in the risk-free asset started at 97% and he slowly reduced this proportion through the mid-60s, not dropping below 60% until 1954-4. From 1962-3 on, he averaged about 80% invested in the risk-free asset. However, never once was he 100% invested in the risk-free asset. This investor made use of the leverage opportunity when allowed to borrow in the period 1956-4 to 1962-2, and again in 1988-2 to 1988-4, thus interrupting his continuous lending policy. The margin purchases were occasionally to the maximum permitted (10 quarters out of 23).

Turning to diversification, we find this investor held each industry at least once (see Table 17a, rows 1-12). He held from one to three industries most times, with an occasional four-industry portfolio, and only once did he hold five (in 1951-3). The most popular investment outlet was Petroleum with holdings in 111 quarters, with Utilities next, which he held 78 times. The least popular industry was Consumer Durables which he held only once (a 4% holding in 1972-3).

Comparing this investor with his more risk averse counterparts, we find the following. (i) The -75 to -30 power investors never borrowed. (ii) The -75 and -50 investors had a continuous presence in the risk-free asset, while the -30 power investor held it in 207 quarters. The -75 investor never held less than 90% of his portfolio in the risk-free asset from 1962-3 on, except for the last quarter of 1986 when he held 89%, while the -50 investor always had 80% or more invested in the riskless asset during this time period. (iii) The policies of the -10 and -5 investor were similar to the -15, except that they made use of leverage more frequently and more often to the limits allowed. (iv) The industries that the -15 investor favoured were likewise favoured by these investors; i.e., Petroleum was the favourite outlet and Consumer Durables was the least popular.

Turning to the logarithmic investor (see Table 13b and also 17a), we find a complete turnabout for this investor compared to power -15. First, the logarithmic investor only lent in 30 quarters, continuously from 1934-1 till 1938-4 and again in the second and third quarters of 1939. He stayed away from the risk-free asset until 1974-3. From this point on, he lent till 1976-4, with the exception of two quarters, after which time the risk-free asset was never in the portfolio. With the exception of one quarter (1938-2), the proportion invested in the risk-free asset never exceeded 40%. Second, this investor made liberal use of margin, employing it continuously from 1939-4 to 1974-1, except for five quarters in the 1940s, four of which (1946-2 to 1947-1) had 100% margin requirements which made borrowing impossible. After 1977-4, leverage was again employed continuously save for six quarters. Usually, this investor borrowed to the margin limits in effect at the time.

From Table 17a, we find that the two most popular investment outlets were Petroleum (100 quarters) and Services (69 quarters), while his least favourite was Consumer Durables (2 quarters). Finally, the portfolio of this investor had at most three industries at any one time, and this was achieved but 19 times out of 212 (see Table 17a). Of note is the fact that this investor lost money in 81 quarters *vis-a-vis* 44 times for the -15 investor.

Comparing the logarithmic policy with the other powers, we note the following. (i) The power -2 investor behaved similarly to the power 0, except that he borrowed less and only occasionally to the limit. Furthermore, he lent more often and diversified into five industries once. (ii) The 0.5 and risk neutral investors never lent, and borrowed in 198 and 206 quarters respectively, most times to the margin limit. Of the six quarters that the power 1 investor did not borrow, only two were by choice (1974-3 and 1974-4). This investor diversified into two industries seven times, from 1938-1 to 1939-3.[62] At other times, he restricted his portfolio to holding only one industry, i.e., in 205 out of 212 quarters, this investor held a one-industry portfolio. (iii) The Petroleum industry remained heavily favoured by these investors.

Turning to the case where margin purchases were not permitted, we find that the investment policies of the power -15 investor were not much different than when leverage was permitted (see Table 14a versus 13a and Table 17a versus Table 17b). This is not surprising. The investment policies were the same for the periods 1934-1 to 1956-3 and from 1962-3 on. In these periods, the power -15 investor never borrowed even when allowed to do so, hence the margin restrictions were not binding. The only difference in the policies appeared in 1956-4 to 1962-2, but the industries invested in were identical except for 1958-4; the proportions held in each were just slightly less for the no leverage case. For the even more risk averse strategies (-30 to -75), the policies were identical.

Examining the policies of the logarithmic investor (Table 14b), we find

[62]This happened because the solvency constraints of the model given by equation (9) in Chapter II were binding.

more differences between the leverage and no leverage cases. Without leverage, the Petroleum industry continued to be the favourite outlet with 88 quarters of investment, closely followed by Services (with 71 quarters). The least popular industry was now Construction (4 quarters) whereas before it was Consumer Durables. This time however, the logarithmic investor held up to five industries (albeit only once) compared to only a maximum of three in the leverage case.

With respect to the other powers, we see from Table 17b that the risk neutral concentrated in one industry all the time. The industries invested in were virtually identical to the ones held when leverage was permitted. The power 0.5 concentrated his investment to one industry even more than when leverage was allowed. Furthermore, he reduced the maximum number of industries held at any point in time to three (versus five when leverage was present). When we remove the leverage opportunities, the portfolios of the higher powers (-5 to 1) which were invested in only one industry increased, from 65 to 68 for power -5 and from 205 to 212 for the risk neutral investor.

There are definite trends evident when we examine the policies of all the active strategies. A striking feature is that each industry was present in the portfolio of the investors at least once. However, not once did any investor have more than five industries in his portfolio. Only seven of the ten powers, with leverage present, diversified into five industries, and they did this but once, while six powers did likewise when the leverage opportunities were removed. The risk-free asset became less important an investment outlet as risk aversion decreased, to the point where it was completely ignored by powers 0.5 and 1. Likewise, a one-industry portfolio became more of the norm as risk aversion decreased. Finally, we note that the investors had about the same number of loss quarters with or without leverage present. The effect of leverage is best displayed in terms of returns (see the first two columns of Tables 3a and 3b) With leverage, the more risk tolerant strategies certainly earned more, but at the expense of greater variability.

2. The Value-Weighted Industries

Tables 15a, 16a and 15b, 16b present the portfolio compositions of the power -15 and logarithmic investors, respectively, when the value-weighted industries are the investment universe. Tables 15a-b contain the leverage cases while Tables 16a-b are when leverage (borrowing) is not permitted. Summary statistics for all the powers are contained in Tables 17c (with leverage permitted) and 17d (with no leverage permitted).

Turning first to Table 15a, when leverage opportunities are present, the power -15 investor's portfolios consisted primarily of the risk-free asset. He lent continuously from 1934-1 to 1955-1, beginning with 97% invested in the risk-free asset and decreasing ever so gradually to 59% in 1954-3. He remained out of the market for this asset until the end of the second quarter of 1962, at which time the risk-free asset again had a strong presence in his portfolio to the end of 1986. In the interim period from 1955-2 to 1962-2, this investor made heavy use of leverage beginning in 1956-4 until 1962-2, most times up to the margin limits (17 quarters out of 23). Only once did this investor stay away from the equity market, and that was in 1974-4.

Looking at Table 17c, we find that the power -15 investor diversified into seven industries once (1956-4), but invested mostly in one or two industries at a time. The most popular outlet was (again) Petroleum, held for 100 quarters, with Services a close second at 83 quarters while the least popular was Finance & Real Estate (13 quarters) and Transportation (tie). There were some substantial changes in which industries were held compared with when the universe was equal-weighted. For example, Consumer Durables was held 26 times here versus just once, and Capital Goods for 59 quarters here versus 11.

Comparing with the other investors, we find the following. (i) The powers -30 to -75 never made use of leverage. (ii) Powers -50 and -75 had a continuous presence in the risk-free asset, while the -30 investor held it for 195 quarters. The -75 power had over 90% of his portfolio in the riskless asset from 1934-1 to 1954-3, and from 1962-3 to 1985-4. This represents 177 quarters out of 212. (iii) The -10 and -5 investors had policies not unlike that of power -15, except that they made slightly more frequent use of leverage. (v) The industries favoured by the -15 investor were similarly looked upon by these two powers.

For the logarithmic investor (see Table 15b), we find him to be a frequent and heavy user of leverage, beginning in 1940-1 through 1973-3, with the exception of three short interruptions - the fourth quarter of 1939, the second and third quarters of 1942, and from 1946-2 to 1947-1 when margin was not permitted. From 1973-4 on, he resorted to borrowing in only three quarters over the next nine years, becoming fully levered from 1982-4 on. Most times he was at the margin limits. Compared with when he managed the equal-weighted universe, this investor resorted to leverage in 14 less quarters.

Turning to diversification, this investor (see Table 17c) never held more than four industries, holding four only twice - in the first and second quarters of 1943. More than half the time, he held only one industry. Like the power -15 investor, he stayed away from the equity market in 1974-4. His favourite outlet was Services (63 quarters), with Petroleum and Capital Goods a close second and third (63 and 62 quarters respectively). The least popular was Finance & Real Estate, held only twice.

Comparing the logarithmic policy with other less risk averse investors, we find the following. (i) The power 0.5 investor lent 12 times, and even the the risk neutral lent (in 1974-4). (ii) The risk neutral diversified into two industries nine times, while concentrating his holding in one industry in 202 quarters. Thus, the diversification across industries declined as the investors became more risk tolerant. (iii) Finally, we see that the risk neutral investor ignored the category Basic Industries, while the rest of the powers invested in each industry at least once.

Turning to Table 16a, the no leverage case, the -15 investor performed much as he did when leverage opportunities were available. Again the investor held seven industries once (in 1956-4), while one and two industry portfolios remained his favourite choice (see Table 17c). The same industries, as in the leverage case, remained popular and unpopular.

The logarithmic investor's (see Table 16b) portfolio choices were more affected by leverage opportunities than were the -15 power. Nevertheless, the portfolio choices were similar, not in fractions of wealth invested in the industries, but in which industries made up the portfolio. The favoured industries remained Services, Capital Goods and Petroleum, while the least popular continued to be Finance & Real Estate. However, this investor had a one-industry portfolio in 140 quarters compared to 111 quarters when leverage was permitted. Moreover, he only had up to three industries in the portfolio at any time compared to up to four with leverage.

The more risk averse investors (-30 to -75) made no use of leverage even when it was available. At the other end of the risk spectrum, the risk neutral investor always had a portfolio of one industry (except in 1974-4 when he lent); i.e., for 211 quarters, whereas in the leverage case he was "forced" to diversify by the solvency constraint (see footnote 10). Moreover, this investor now completely ignored two of the twelve industries - Basic Industries as in the leverage case and Utilities - and invested in one industry twice (Finance & Real Estate and Transportation, as he did when leverage was available).

Summarizing, we can see some definite trends when the industries are value-weighted. All the powers, except the risk neutral, invested in each industry at least once. Both the -15 powers (leverage and no leverage cases) had up to seven industries in their portfolio once. The more risk averse powers invested in up to six industries, and the diversification dropped as the risk aversion declined, culminating with the risk neutral having 211 quarters in which he had a one-industry portfolio. Suprisingly, all the powers lent at least once in contrast with when the universe was equally weighted. While the more risk averse investors (-30 to -75) had several quarters in which they were fully invested in the riskless asset, 1974-4 was the only quarter in which all the investors stayed away from equities. Finally, we see that the number of quarters in which the portfolio earned negative returns were about the same whether leverage was employed or not. As with the equal-weighted industry universe, leverage, when employed, tended to enhance the portfolio returns but increase the variability.

D. Portfolio Compositions: The Base Case versus The Other Cases

We now proceed to describe the salient features of the portfolio compositions of the investors under the various cases considered in the thesis. We have to consider: (i) the twenty-four and eight industry universes, (ii) the 28 and 40 quarter simple probability assessment approach, (iii) the 32 quarter simple probability assessment approach with an inflation adapter, and ,(iv) the "sum-of-the-digits" probability assessment approach, (v) the "all-of-history" simple probability assessment approach, and (vi) the three "disaster states" scenarios to the 32 quarter simple probability assessment approach. Note that (ii)-(vi) above utilize the twelve industry universe only. The above cases are summarized in Tables 18a-b through to Tables 27a-b respectively.

For each case, we have 10 active strategies, equal- and value-weighted industry universes, and with leverage and no leverage present. Given the tremendous number of portfolio policies generated, we consider the -15 power and the logarithmic investors' portfolio policies, and remark only on the differences, if any, with our base case equivalents. Furthermore, the analyses of the portfolio compositions in the base case have shown that the leverage and no leverage cases are quite similar in terms of industries invested (number and type, but in smaller proportions) so that we report on the results of only the leverage cases.

1. 8 and 24 Industry Universes

We turn our attention to a description of the salient points when the 32 quarter estimating period simple probability assessment approach is applied to the eight and twenty-four industry universes. A summary is given in Tables 18a-b and 19a-b respectively. However, we will describe the policies in more detail than with the other cases since this is the only time we use a universe other than the twelve industry base case.

1a. The Eight Industry Universe

Consider the eight equal-weighted industry universe first (see Table 18a). The -15 power was in the risk-free asset continuously from 1934-1 to 1956-3, and again from 1962-3 on, while the logarithmic investor lent from 1934-1 to 1938-4, and from 1974-3 to 1976-1. Borrowing for the -15 power was sporadic in the non-lending quarters and only very occasionally was he at the margin limits. The power 0 investor was very different, employing margin to the limit with great regularity.

In terms of diversification, the -15 and 0 investors invested in all industries at least once, with Energy the favourite outlet (124 and 105 quarters respectively) and Construction the most unpopular (once and 14 times respectively). Construction was completely ignored by the -75 and -50 powers. The maximum invested in industries was three for both investors, although the other powers occasionally went to four. Thus, in comparison with our twelve industry base case (see Table 17a), these powers found the same outlet to be the most attractive (Petroleum and Energy); invested in the risk-free asset about the same number of quarters (190 and 29 quarters for -15 and 0 here versus 189 and 30 quarters in the base case); and had about the same number of loss quarters (44 versus 43 for power -15 and 80 versus 81 for power 0).

When the universe was value-weighted (Table 18b), the -15 power lent from 1934-1 to 1955-1, and again from 1962-3 on. Power 0 lent from 1934-1 to 1939-3 and 1973-3 to 1976-1, and sporadically thereafter. Leverage was employed to the limit by the logarithmic investor most times, while the -15 power was more judicious in his use of leverage.

Like the equal-weighted universe, all industries were chosen at one time or another. The most popular investment vehicle was (again) Energy while Construction (again) seemed to be out of favour, for all investors. This time however, five industries were the most in any portfolio. A key difference for the powers 0.5 and risk-neutral investors (for the value- versus equal weighted universe) was that now they invested in the risk-free asset as well, forsaking completely the equity market at times. This also occurred in our twelve industry base case. Finally, for both the -15 and 0 powers, the number of losing quarters were about the same; and they lent and borrowed for about the same number of quarters as they did with the twelve industry case.

1b. The Twenty-four Industry Universe

Turning to the twenty-four equal-weighted industry universe (see Table 19a), we find some interesting results. The -15 investor lent from 1934-1 to 1954-3, and again from 1962-3 on, while the power 0 investor lent only to 1939-3 (in four quarters prior to 1939-3, he did not hold the risk-free asset) and thereafter only twice, both in the mid-1970s. Leverage was employed by power -15 continuously from 1956-4 to 1962-2 (about half the time to the limit). The 0 power investor employed borrowed funds almost continually from 1939-4 on, save for twelve quarters in the 1970s, and usually to the margin limits.

The investment policies were quite different (see Table 19a) from the twelve industry case. The -15 investor completely ignored three industries (Banks & Financial Services; Chemicals, Rubber & Plastic; and Fabricated Metal Products), while the logarithmic investor ignored the same thre plus Food, Textiles and Utilities. In general, all investors ignored at least one industry with the twenty-four industry universe. The most industries held in a portfolio was six, and most powers preferred two to four. The popularity of

Tobacco, Mining and Oil & Gas Exploration was evident.

Looking at the value-weighted industries (Table 19b), the lending policies of the -15 power, from 1934-1 to 1954-3 and from 1962-3 on, were identical with when the universe was equal-weighted. The power 0 policies, however, were radically different; here the risk-free asset was in the portfolio only eight times - three in the mid 1930s and five in the late 1970s to early 1980s. This time the -15 investor borrowed to the maximum allowed about 75% of the time, while the power 0 again usually margined to the limit.

Considering diversification, not all industries were in the investors' portfolios (see Table 19b). Banks & Financial Services and Metals were ignored by the -15 investor, while power 0 did not entertain Banks & Financial Services, Fabricated Metal Products, and Railroads & Trucking. Again, Tobacco and Oil & Gas Exploration were the favourite investment outlets. A surprising result was that the risk neutral investor diversified in up to four industries because of the solvency constraint (see footnote 10), albeit only once, while the most any investor held was eight industries (for the -50 and -75 powers).

Comparing the value- with the equal-weighted universe for the -15 and 0 powers, we find very different industries favoured. For example, Chemicals, Rubber & Plastics now entered the portfolios over twenty times while it was ignored previously.

Summarizing, we find both differences and similarities between the base case twelve and the twenty-four industry universes. The lending policies of the -15 investor were generally alike in that he lent and borrowed in the same quarters, while those of the power 0 investor were much more varied. One facet that did not change was that these investors lost money about the same number of times (about 80 for the power 0 and about 45 for the -15 power), regardless of leverage, the size of the investment universe and the weighting scheme. In general, none of the investors diversified widely, with a portfolio of two to four industries being the most frequent.

2. The 28 and 40 Quarter Simple Probability Assessment Approaches

We examine the policies of the -15 and 0 power investors for the twelve industry universe, noting only the differences, if any, with respect to the 32 quarter base case. A summary of the 28 quarter and 40 quarter estimating period simple probability assessment approach to managing the twelve industry universe (equal- and value-weighted) is given in Tables 20a-b and 21a-b respectively. Note that we present the results from 1936 on since this is the first year in which the 40 quarter estimating period approach makes a portfolio selection.

2a. The 28 Quarter Estimating Period

Considering first the equal-weighted industries (see Table 20a), the power -15 investor ignored the risk-free asset beginning in 1955-4 (one year earlier than in the base case).[63] In the interim period, he borrowed, usually to the margin limits and more than in the base case, except for the second quarter of 1960. The power 0 investor, on the other hand, lent from 1936-1 to 1936-4 (two years less), and only three times thereafter until 1974-3. This lasted until 1976-2, and except for 1979-1, he did not have the risk-free asset in his portfolio again. He almost had a continual levered position from

[63]Note that all comments are in comparison with the base case investor, i.e., the power -15 investor in the other cases with the power -15 investor of the base case.

1937-1 on, levering just five quarters more than in the 32 quarter base case. Thus, the lending and borrowing policies appear somewhat similar to the base case, except that the investors began levering earlier and a little more often.

No industry was ignored by the investors (see Table 20a). In terms of diversification, the most industries held was four, achieved five times by power -15 (and the middle powers). This compares with the 32 quarter base case (Table 17a). Furthermore, the same industries were favoured by the investors here as were in the base case. A small difference was that the investors here usually lost in slightly fewer quarters. A striking difference was that only the -75 investor in the 32 quarter base case completely ignored the equity markets (three times) while all investors here ignored equities at least once and up to eight times for the power -75. Moreover, in this case, all investors lent whereas powers 0.5 and 1 never did (Table 17a).

When the industries were value-weighted, the power -15 began levering a year and a half earlier. This also occurred for the power 0 investor. Thus investors with a 28 quarter estimating period borrowed more times (and therefore lent less times) than in the base case. We see that investors here were slightly more inclined to be 100% invested in the risk-free asset (see Table 20b versus 17c).

Where diversification was concerned, we note that in the base case the -15 power held a portfolio of seven industries (once) whereas the investor in the 28 quarter estimating period case managed to hold only six (three times). The same investment outlets remained popular, but all industries were held at least once *vis-a-vis* the 32 quarter base case where the risk neutral investor ignored at least one industry. Moreover, the investors here lost money in fewer quarters.

Summarizing, we find that while there were differences in the policies of the investors when the 28 quarter estimating period was compared with the 32 quarter base case, they were not large. Nevertheless, the differences did have an effect on the geometric mean returns and variability (see Table 7a).

2b. The 40 Quarter Estimating Period

For the equal-weighted industries, a key difference of the powers -15 and 0, with a 40 quarter estimating period compared to the 32 quarter base case, was that here they levered less frequently, i.e., were in the risk-free asset more often, and to a lesser extent. With respect to diversification, we find (see Table 21a versus 17a) the same industries were favoured (and out of favour). Moreover, five industries were the most held in any portfolio, although this occurred more often here than in the 32 quarter base case. Finally, we note that the powers here had less quarters of negative portfolio returns than in the base case. However this did not translate to higher geometric mean returns overall (see Table 7a).

Turning now to the value-weighted industries in Table 21b and comparing this table with Table 17c, we find that the powers, with the 40 quarter estimating period, lent more often (see the lending row).[64] The next row shows the the powers levered themselves less frequently.

The industries chosen generally matched in terms of relative popularity, but we see, for example, that Petroleum was more favoured with a 40 quarter estimating period (chosen more than half the time) than when the 32 quarter

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[64]Note that Table 21b starts in 1936-1 while Table 17c begins with 1934-1, for an 8 quarter difference. But most powers lent in these 8 quarters so just subtract 8 quarters from the lending row in Table 17c to get a direct comparison.

estimating period was used. A notable difference is that the risk neutral ignored four industries completely this time, versus only one in the base case. Furthermore, this investor was forced to diversify in 15 quarters. Finally, a significant difference is the number of times each investor was 100% invested in the risk-free asset.

Thus, while the differences were not major, they did contribute to the more risk tolerant powers having a lower geometric mean than the base case (see Table 7a).

3. A Simple Probability Assessment Approach with an Inflation Adapter

Tables 22a-b present a summary of the portfolio choices of the investors when the 32 quarter estimating period simple probability assessment approach with an inflation adapter is used to estimate the joint return distribution.

When the industries were equally weighted, we find notable differences in the investors' policies when the inflation adapter and the simple probability assessment approaches are employed. First, the inflation adapter caused the all the powers to lend more often (see Table 22a versus 17a). Even the risk neutral investor was fully committed to the risk-free asset in fourteen quarters, whereas previously it was fully held but once. We see that all investors stayed out of equities for at least fourteen quarters (up to twenty-two quarters for the power -75), whereas only power -75 did so previously, and only for three quarters. This in turn shows up in the use of leverage; it was employed less frequently and in lesser amounts. Second, the approach dampened the investors' enthusiasm for all industries; for example, the Petroleum industry was held for less than 100 quarters by all investors, in contrast to the simple probability assessment base case. Third, not more than four industries were held compared with up to five previously. Finally, the investment policies were not much different up to 1966; thereafter, investors here tended to use more of the risk-free asset than in the base case (and hence used less leverage).

Examining the value-weighted industries (Table 22b versus 17c), we find the same striking differences as in the equal-weighted industries case. The investors lent more often with the inflation adapter, but more notable is the fact that they completely ignored equities in at least twenty-one quarters and up to thirty-three quarters for power -75, whereas with the simple probability assessment approach most powers were fully invested in the risk-free asset for only one quarter, and up to eleven quarters for power -75. Finally, there was lesser enthusiasm for the industries, i.e., the investors usually had the industries in their portfolio less often, e.g., the power -15 investor held Petroleum in 17 less quarters.

Summarizing, we see some striking differences in the policies of the investors when the inflation adapter is used to adjust the simple probability assessment approach to estimating the return distribution. However, when we compare Tables 3a (columns 1-2) and 9a (columns 1-2), we find higher geometric means (with slightly more variability) in the base case when the universe is equal-weighted. Thus the differences in policies did not show up as strongly as differences in geometric means and variability of returns. Even the period 1966-86 showed little difference (see Tables 3a, columns 3-4 and 9b, columns 1-2). When we examine Tables 4a (columns 1-2) and 10a (columns 1-2) we see marked differences for the 1934-86 period when the universe is value-weighted. There were higher geometric means and lower variability for the higher powers (-2 and up) with the inflation adapter.

Furthermore, these differences show up for all powers in the 1966-86 period (see Tables 4a columns 3-4 and 10b, columns 1-2). Thus, the inflation adapter method enhanced the returns of investors managing a value-weighted universe, particularly for the later years.

4. *A "Sum-of-the-Digits" Probability Assessment Approach*

The results for this case are presented in Tables 23a and 23b for the equal- and value-weighted industries respectively. Turning first to the equal-weighted industries (see Table 23a) and comparing with the simple probability assessment approach base case (Table 17a), we find slight differences in the investors' policies. First, this method caused the powers 0.5 and 1 to lend. Moreover, all the investors were 100% invested in the risk-free asset for at least three quarters whereas only the power -75 in the base case did the same. Second, the investors placed slightly less reliance on a one-industry portfolio and yet never held more than five industries; only the middle powers invested in five industries and they did it more than once. The base case powers held a five-industry only in one quarter, but more investors did it. Third, the risk neutral investor ignored Capital Goods, whereas all industries were held in the base case. The previously favorite industries (Petroleum and Services) continue to remain an important investment outlet, but to a lesser extent. This method "enticed" the investors to hold more of the Finance & Real Estate, Food & Tobacco and Leisure industries.

Turning to the value-weighted industries (Tables 23b and 17c), we find similar results. Specifically, the investors were fully in the risk-free asset more times than with the base case. As well, they made more frequent use of leverage. However, the effect on which industries were held were almost reversed. Petroleum and Food & Tobacco increased in importance while Leisure continued to be held about the same number of times. A significant difference is that the base case investors held up to seven industries, while six was the most in this case. Furthermore, the lower powers diversified a little more than the base case powers; there were more portfolios containing two to four industries.

While there were some differences when compared with the base case, they were not large. Comparing returns, we findthe lower powers had higher mean returns than in the base case (see Tables 4a and 5a versus 9a and 10a). This could be due to the lower powers holding less one-industry portfolios than in the base case.

5. An "All-of-History" Probability Assessment Approach

Tables 24a-b is a summary of the portfolio compositions when investors employ an "all-of-history" probability assessment approach to estimating the joint return distribution. We previously noted that this approach did not do as well in terms of returns as the base case 32 quarter simple probability assessment approach (see Tables 3a, columns 1-2 versus 9a, columns 5-6 and Tables 4a, columns 1-2 versus 10a, columns 5-6).

For the equal-weighted industry universe (see Table 24a versus 17a), we find large differences in the portfolio compositions. First, many industries never entered into the investors' portfolios with the "all-of-history" approach whereas they were all held, at one time or another, in the 32 quarter base case. Second, even the moderately risk averse investors (up to power -2) never made use of leverage compared with the base case investors. These investors always had the risk-free asset in their portfolios in relatively high proportions; for example the -75 power never had more than 3%

of his portfolio in equities, and the -5 power had a minimum of 68% invested in the risk-free asset all the time. Third, the middle powers held a three-industry portfolio more than half the time versus about a quarter of the time in the 32 quarter base case. Fourth, the lower powers had fewer quarters in which their portfolio earned negative returns.

When we examine the value-weighted industry universe (Tables 24b versus 17c) case, we find similar marked differences. A minimum of five industries were never held by the investors. The low to middle powers always lent, and had more quarters in which they were fully invested in the risk-free asset. Even the risk neutral had four quarters in which he only lent. The conservatism of the middle to lower powers shows up when we compare loss quarters. Surprisingly, the power -75 investor had a one-industry portfolio more than half the time, while the other powers tended to choose a two- to four-industry portfolio.

Summarizing, we find marked differences between the policies of the investors under the "all-of-history" approach and the 32 quarter simple probability assessment approach. The lower powers were definitely more conservative in their portfolio selection, and this showed in their mean returns (Tables 3a versus 9a, and 4a versus 10a).

6. A "Disaster States" Probability Assessment Approach

The summaries of the three "disaster states" scenarios are presented in Tables 25a-b through 27a-b. Table 25a-b contains the results when investors face a "J-1" "disaster states" scenario. Of the three scenarios, this one assigns the lowest probability of occurrence to each of the "disaster" states. Table 26a-b contains results for the "J-6" "disaster states" scenario, and Tables 27a-b presents the "worst" case scenario results; for

"J=12" which assigns each "disaster" state a probability equal to each of the "normal" states.

Turning first to Table 25a, the "J=1" "disaster states" scenario, we find that it almost compares with the base case (Table 17a). A difference was that these investors were slightly more conservative, i.e., they lent more (and hence borrowed less often). However, they tended to hold one-industry portfolios. Furthermore, Consumer Durables never entered into the five most risk averse investors' portfolios, whereas all industries were held in the base case. Clearly, the addition of these "disaster states" made the investors more conservative; even the power 0.5 lent (for 8 quarters).

Comparing Tables 25b with 17c (the value-weighted universe), we again find only minor differences. Specifically, both cases had investors holding up to seven industries, but we notice that the "disaster states" scenario had the investors fully in the risk-free asset more times; at least for ten quarters, and up to 34 quarters for the power -75. Clearly the method affected the high powers more; they had fewer quarters in which they levered their portfolios.

Turning to the "J=6" "disaster states" case (equal-weighted industries), we see from Tables 26a versus 17a that this "higher probability of disaster" scenario had a pronounced effect on portfolio policies. An outstanding difference was that the investors in this case had at least 66 quarters in which they ignored equities, rising to 117 quarters for the power -75 investor. Contrast this to the base case, and we find that this "middle" probability assignment to the "disaster states" had a sobering effect on investor policies. Petroleum, Utilities and Services continued to be their favourite investment outlets whenever they decided to venture into the equity markets. Capital Goods were ignored all the time. We note that, despite the existence of such "disasater states" in the joint return distribution, the powers -15 to 1 investors still levered, albeit less frequently than in the base case. The logarithmic investor, for example, borrowed in 51 quarters; from 1954-4 for 31 consecutive quarters up to the end of 1962-2, and from 1986-2 to the end, he was fully levered to the limits allowed.

Comparing Tables 26b with 17c (the value-weighted industries), we find the same effects on the portfolio policies of the investors as in the equal-weighted universe. The investors were fully invested in the risk-free asset in more than 100 quarters, even the risk neutral investor. However, these investors ignored less industries than when the universe was equally weighted.

Turning to the "J-12" "disaster states" scenario (Table 27a) when the industries were equal-weighted, we (naturally) find that this scenario had an even more sobering effect on the investors. A minimum of 156 quarters were devoted to portfolios of the risk-free asset only. Five industries were ignored altogether, with Utilities and Services being the popular choices whenever the investors were in the equity markets. Nevertheless, the powers -15 and up investors still levered themselves. For example, the logarithmic investor was levered from 1954-4 through to 1962-2 (only), employing margin to the limit in all but the first quarter.

Finally, looking at Tables 27b versus 17c (the value-weighted universe), we basically find the same results as above. A risk-free asset portfolio was the norm for at least 160 quarters; the powers -15 to 1 investors still managed to employ leverage in the face of such states; and two industries were completely ignored by all investors. The existence of such states in the joint return distribution certainly made all investors wary of the equity markets. No doubt this is the reason the loss quarters dropped dramatically.

Summarizing the "disaster states" scenarios, we find both intended and unintended consequences of introducing such states into the joint return distribution. For example, we expected the policies to be more conservative as J went from 1 to 12, but the effects of J=12 and J=6 were certainly extreme. The results of such dramatic shifts in investment policies are clearly demonstrated in the mean returns earned by the investors. While the geometric means certainly decreased, the variabilities did not appear to fall sufficiently to compensate. Certainly the motivation behind this approach cannot be faulted; it is imperative in using a "moving window" approach for the investor to be constantly aware that "disasters" can happen. For example, in the bull market of the 1980s, an investor might have easily forgotton what could happen, as was demonstrated by the October 1987 decline of the equity markets around the world. The smaller the "window" that is used to estimate the joint return distribution, the more important such an approach is to avoiding disasters in an investment portfolio.

VII. The Results: Statistical Tests of Investment Performance

In view of the differences between the returns earned by some of the active strategies and their corresponding passive and semi-passive benchmark portfolios (see Tables 3a-b and 4a-b), it is desirable to conduct some tests of investment performance for these active strategies. We noted in Chapter VI that these differences were economically significant; in this Chapter, we test to see if they are statistically significant using the paired *t*-test. This test was described in Chapter IV.

We also examined the robustness of the Grauer-Hakansson 32 quarter simple probability assessment approach by: (i) varying the size of the investment universe, while using the base case 32 quarter simple probability assessment approach; and, (ii) keeping the base case universe of twelve industries, while employing several techniques to estimate the joint return distribution. The comparison of the geometric means of the active strategies under (i) and (ii) with the base case revealed that the simple probability assessment approach is not without merit. At times, this approach produced portfolio returns that were economically significantly better than the other methods used to estimate the joint return distribution. We use the paired *t*-test to see whether these results are statistically significant as well.

Finally, we test for abnormal investment performance of the base case active strategies using the well known Jensen performance test and the Treynor-Mazuy and Henriksson-Merton tests of market timing. These measures were described in Chapter IV.

A. Paired t-tests

Tables 28 and 29 report the results of selected (one-tailed) paired t-tests between the return series of the active strategies in the base case and the return series of comparable passive and semi-passive benchmark portfolios. Table 28 contains the results when the investment universe is equal-weighted, while Table 29 is for the value-weighted universe.

There are three panels in Table 28. Panel A reports the t-statistic for the full period 1934-86 when leverage is permitted. Panel B is the same as Panel A, except that it is for the sub-period 1966-86. Finally, Panel C reports the comparisons for the sub-period 1966-86 when leverage is not permitted. Note that the table contains only selected comparisons. We compare those active strategies which had higher geometric mean returns than passive and semi-passive benchmark portfolios having comparable standard deviations as is shown in Figures 1a-d. Thus, we ignore those active strategies that underperformed their comparable benchmarks. For example, we make no comparisons for the active strategies in Figure 1c. The comparisons in Table 29 is chosen in the same spirit. Thus, Table 29 only reports the sub-period 1966-86, when margin purchases are permitted (Panel A), and when they are not (Panel B).

We report for each active strategy, the t-statistic on the differences of the return series under the various universes, estimation periods, and return distribution estimation techniques with the comparable base case strategy (e.g., the logarithmic investor in the base case versus the logarithmic investor when one of the base case parameters is varied). The results are given in Tables 30a-b through Tables 37a-b. All these tables are similarly constructed. Each table has two parts, "a" and "b". Part "a" always contains the equal-weighted investment universe, while "b" contains the value-weighted universe. Each part reports the with leverage and without leverage cases for two periods, 1934-86 and 1966-86.

We briefly describe each table. Tables 30a-b make the comparison between two universes - the twelve industry universe versus the eight - while using a 32 quarter simple probability assessment approach. Tables 31a-b compare the twelve industry universe versus the twenty-four industry universe. Tables 32a-b compare two estimating periods; the base case 32 quarter estimating period with the 28 quarter one, while using a simple probability assessment approach and a twelve industry universe. Similarly, Tables 33a-b report the comparisons of the 32 quarter estimating period with the 40 quarter one. Tables 34a-b through to Tables 37a-b compare the base case with the other estimation techniques. The base case uses the twelve industry universe and a 32 quarter estimating period simple probability assessment approach. Tables 34a-b report the comparisons between the base case and the inflation adapter to the simple probability assessment approach. Tables 35a-b compare the base case with the "sum-of-the-digits" approach to assigning the probabilities of the return distribution. Tables 36a-b contain the comparisons between the base case and the "all-of-history" probability assessment approach. Finally, Tables 37a-b compare the "disaster states" scenario with the base case.[65]

1. The Base Case: Active Strategies versus The Benchmark Portfolios

Turning to Table 28, we find mixed results. A notable feature in all

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[65]We report only the "disaster states" approach for J-1. As the results of Chapter VI revealed the J-6 and 12 approach do not merit further consideration.

three Panels A-C is that the portfolio returns of the highly risk averse investors (powers -75 to -30) showed statistically significant differences when compared to the returns on the risk-free asset. The logarithmic investor, who earned 19.05% per year in the 1966-86 sub-period, did manage to statistically beat the passive benchmark V20 which earned only 7.15% in the same period. However, the paired *t*-test did not show any difference between this investor and the E14 benchmark (13.95%) which had comparable variability. Thus, on the basis of the paired *t*-tests, it appears that most of the active strategies managing an equally weighted industry investment universe did not statistically outperform their comparable benchmark portfolios, even though there is little doubt about the economic significance. The results for investors managing the value-weighted universe are not any better (see Table 29). In fact, none of the active strategies outperformed their benchmark portfolios.

2. The Base Case versus The Eight and Twenty-four Industry Universes

Considering the eight industry universe first (see Tables 30a-b), we find there is hardly any difference (statistically) whether investors manage a twelve or eight industry universe. Only when the industries were value-weighted (Table 30b), did the very risk averse investors managing twelve industries outperform their counterparts managing eight (and only in the full period 1934-86).

When we compare the portfolio returns from managing the twelve versus the twenty-four industry universe (see Tables 31a-b), we find the more risk tolerant investors managing twelve industries outperforming their counterparts in the 1966-86 period, but not always (see Table 31a, Panels A and B, and Panel A of Table 31b). Conversely, the very risk averse investors did better in the 1934-86 period when managing the twenty-four equal-weighted industries. On the whole, there appears to be no consistent difference when the universe is eight, twelve or twenty-four industries.

3. The Base Case Universe: 32 Versus 28 versus 40 Quarter Estimating Periods

Consider the 32 versus 28 quarter estimating period presented in Tables 32a-b. First, no differences showed up in the sub-period 1966-86. Second, the most statistically significant differences are when investors manage the equal-weighted universe in the 1936-86 period (see Table 32a, Panels A and B). The low powers (-75 to -15) performed much better with the 28 quarter estimating period, whereas it did not matter for the other investors.

Turning to Tables 33a-b, we find virtually no difference using the 32 or 40 quarter estimating period when the industries are equally weighted. On the other hand, the low powers did better with a 32 quarter estimating period during the 1936-86 period when managing the value-weighted industries. A general observation is that the length of the estimating periods did not matter for the middle to high powers. The low powers, at times, did much better with different estimating periods, but only for the full period 1936-86.

4. The Base Case versus The Simple Probability Assessment Approach with an Inflation Adapter

The results of the inflation adapter to the simple probability assessment approach are shown in Tables 34a-b. The paired *t*-tests showed no difference of one approach over the other. This is in contrast to the Grauer-Hakansson (1988) study utilizing the same approach. This does not augur well for this Grauer-Hakansson method to adjusting the return distribution at the more micro level. Perhaps the method is data specific.

5. The Base Case versus The "Sum-of-the-Digits" Probability Assessment Approach

Tables 35a-b show that the low powers did better with the "sum-of-the-digits" method of assigning probabilities to the joint return distribution, at least for the full 1934-86 period. This occurred whether equal- or value-weighted industries were the universe and whether leverage was available or not. The period 1966-86 showed that there was no difference which assessment approach was used used; i.e., whether we weighted the realized returns equally or otherwise. This was particularly true for the higher powers.

6. The Base Case versus The "All-of-History" Probability Assessment Approach

Table 36a, Panels A and B, show some very significant differences between the "moving window" approach and the "all-of-history" approach. For the full 1934-86 period, the portfolio returns of the low to middle powers (-75 to -2) show marked improvement when all the historical realized returns were used to estimate the joint return distribution. The differences were less dramatic for the 1966-86 period, however. Turning to Table 36b, the same powers again did better with the "all-of-history" approach for the period 1934-86, but all differences disappeared during 1966-86. Thus, there appears to be some value to this approach.

7. The Base Case versus A "Disaster States" Scenario When J = 1

We see some very statistically significant differences in the returns for the full 1934-86 period in Tables 37a and 37b, Panels A and B. The low to middle powers' portfolio returns were significantly lower than comparative portfolio returns of the base case. Again, the sub-period paired *t*-statistics showed no perceived differences of portfolio returns under these two approaches. Thus, the motivation behind the "disaster states" approach, while logically valid especially when using a "moving window" approach, leads to very much lower returns as the results of the paired *t*-tests show. This is despite the fact that the J = 1 setting assigns a relatively low probability of occurrence to the "disaster states".

8. Concluding Remarks

A common thread runs through the results of the paired *t*-tests. In all the comparisons made, we used a base case twelve industry universe with a 32 quarter simple probability assessment approach. We then "tweaked" the estimation method by introducing ways of (hopefully) enhancing the results. We noticed that in many cases for the full period, the lower powers had significantly different (good and bad) returns from the base case, whereas the high powers hardly ever showed any difference from one method to another.

For the base case, there were some statistically significant differences in returns for the active strategies when compared to the passive benchmarks, and none when compared to the semi-passive benchmark portfolios. This augurs well for the multiperiod portfolio model applied to industry rotation.

When we examined the robustness of the joint return distribution estimation method of Grauer-Hakansson, we come the overall conclusion that the simple probability assessment approach performs well. The addition of an inflation adapter to the simple probability assessment approach did not enhance portfolio returns. This is in contrast to the Grauer-Hakansson (1988) study where they showed that this method, combined with the multiperiod portfolio model, exhibited an ability to "time the market". We continued with our extensions of the Grauer-Hakansson studies by using different amounts of realized returns to estimate the joint return distribution. In most cases, it did not matter whether we used a longer or shorter (than 32 quarters) term. This is consistent with the previous studies.

When we introduced new and innovative estimation techniques based on "common sense" and logic, we found mixed results. The "disaster states" scenario, while logical and sound, produced results that were statistically inferior to the base case method. The most affected were the low powers. The high powers practically ignored the "disaster states" appended to the estimated return distribution for the case when J = 1, while cases J = 6 and 12 were too extreme. The "all-of-history" method also did not fare well in comparison with the simple probability assessment approach. As expected, this method produced an estimate of next period's joint return distribution that was too conservative resulting in the lower powers having statistically inferior portfolio returns. Finally, there seems to be some merit in the "sum-of-the-digits" approach to assigning probabilities to the joint return estimates. This "common sense" appeal approach drawn from univariate time series modelling benefitted the low to middle powers (statistically), particularly over the full time period 1934-86 considered here. This is interesting because the univariate time series literature is replete with examples indicating that a differenced series of stock prices follows a random walk, i.e., a zero order or "white noise" model. Thus the "sum-of-the-digits" method, which assigns the more recent returns a higher probability of occurrence in the next period, in conjunction with the multiperiod portfolio model, implies (possibly) that there is more information in the recent rather than the distant past. The univariate literature implies that there is no information contained in past prices or price changes (as does the weak-form efficient markets hypothesis). Therefore, it is difficult to explain why the Grauer-Hakansson simple probability assessment approach and this "sum-of-the-digits" technique appear to do so well.

B. Investment Performance Measures

We now proceed with measures commonly used to compare portfolio performance. Specifically, we present the Jensen Performance Index test in Tables 38 and 39; the Treynor-Mazuy market timing test in Tables 40a-b and 41a-b; and, the Henriksson-Merton test of market timing ability in Tables 42a-b and 43a-b. Note that we present the results of these performance measures only for the base case; i.e., only when investors manage the twelve industry universe, with and without leverage, for the two periods 1934-86 and 1966-86.[66]

1. The Jensen Performance Index

Tables 38 and 39 present a summary of the Jensen measure. This measure is just the intercept, α, from a characteristic line regression. The benchmark or "market" portfolio used in constructing this test is the CRSP value-weighted index.

The format of the tables requires some explanation. Table 38 contains the regression results for the 10 active strategies managing the twelve equal-weighted industries. In Table 38, Panels A and B show the results when leverage opportunities are available, while Panels C and D show the results

[66]This is for economy of space reasons. Besides, the paired *t*-tests have shown the base case to be as good as or better than the other cases. However, for completeness, we did calculate all the performance measures for the other cases.

when margin purchases are not permitted. Panels A and C are for the period 1934-86, and Panels B and D are for the sub-period 1966-86.

Each of the panels in Table 38 reports the the mean, standard deviation, minimum and maximum values of: (i) the R^2 of the 10 regressions; (ii) the estimated regression intercept, $\hat{\alpha}_p$, which is also the measure of performance with the *t*-statistic in parentheses; and, (iii) the estimated regression slope, $\hat{\beta}_p$, with *t*-values shown in parentheses. These summary measures are shown in the four leftmost columns. The six rightmost columns contain summary counts of the Jensen measure, $\hat{\alpha}_p$. Notice that these are given on the lines containing the $\hat{\alpha}_p$ statistics. First, we note if the $\hat{\alpha}_p$ for each investor's portfolio is positive (superior performance) or negative (inferior performance). This count of positive and negative $\hat{\alpha}_p$ is given on the first line. Second, are these estimates statistically different from zero at the 5% and 1% levels? The number of significant positive and negative estimates are given on the second line. Thus, there should be four numbers on this line. Note that we use the symbol "..." to denote a zero value. Table 39 is constructed to parallel Table 38, except that it contains the results when investors manage the twelve value-weighted industries.

The results from Tables 38 and 39 are encouraging. When the equal-weighted industries were the universe (see Table 38), the active strategies all attained positive values for $\hat{\alpha}_p$ indicating superior performance in both the 1934-86 and 1966-86 time periods. Statistically, the 1966-86 sub-period showed the active strategies to have performed rather well. For example, in Panel B (1966-86 period with leverage present), we find nine out of the ten active strategies had $\hat{\alpha}_p$ significant at the 5% level, with one at the 1% level. The average $\hat{\alpha}_p$ in this time period was 1.108% per quarter, with a minimum of 0.071% and a maximum of 2.731% per quarter. However, for the full time period, 1934-86, only about half the active strategies showed any significant $\hat{\alpha}_p$ values (see Panels A and C).

The results shown in Table 39 (the value-weighted universe) are not quite as strong as in Table 38, with some active strategies exhibiting negative values for $\hat{\alpha}_p$. We note that none of the strategies showed any significant abnormal performance in the 1966-86 sub-period, while only three out of ten were significant at the 5% level during the 1934-86 period.

Thus the Jensen measure seems to indicate (mostly) superior investment performance on the part of the active strategies when compared with the CRSP value-weighted benchmark.

2. The Treynor-Mazuy Market Timing Test

Tables 40a-b and 41a-b give the results of the Treynor-Mazuy regression described in Chapter IV. The construction of these tables parallel Tables 38 and 39, with two exceptions. The first is the addition of a second term in the regression (the quadratic term) to measure market timing ability which necessitates adding two more lines to the tables. The second is the addition of Tables 40b and 41b. These two extra tables replicate Tables 40a and 41a respectively, except that we make a correction for heteroscedasticity[67] present in the regression (see also Henriksson and Merton (1981) and Henriksson (1984) for more details). The coefficient of interest is $\hat{\beta}_{2p}$. This measures the the ability of the manager to "time" the market, i.e., move funds into equities in an up-market and out of equities in a down-market.

Turning to Tables 40a and 41a, the results show evidence of market

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[67]The correction is described in White (1980).

timing by the active strategies managing the equal-weighted industries. For example, in Table 40a for the 1966-86 period (Panels B and D), all the power policies attained a positive $\hat{\beta}_{2p}$. While not all the coefficients were significant, more than half were statistically significant at the 5% level. However, the results for the full period 1934-86 (Panels A and C) show seven out of ten policies exhibiting negative timing ability, with most significant at the 5% level. Turning to Table 40b, when we correct for heteroscedasticity, all the significant negative timing ability disappeared, but some significant positive timing ability still remained (Panels A and C).

When the industries were value-weighted (Table 41a), we still find strong evidence of market timing ability; mostly positive in the 1966-86 sub-period and mostly negative in the full 1934-86 period. Note that all significant timing ability (positive and negative) disappeared upon correcting for heteroscedasticity (see Table 41b).

3. The Henriksson-Merton Market Timing Test

Finally, Tables 42a-b and 43a-b present the summary results of the Henriksson-Merton tests for market timing ability. The test was described in Chapter IV. These tables are constructed exactly like those for the Treynor-Mazuy test (Tables 40a-b and 41a-b). Table 42a contains the results when the universe is equal-weighted, while Table 43a is for the value-weighted universe. Lastly, Tables 42b and 43b contain the results when the heteroscedastic correction is made.In all cases, the market portfolio was the CRSP value-weighted index.

The results for the active strategies managing the equal-weighted universe are like the Treynor-Mazuy results. First, the 1966-86 sub-period showed the active strategies able to time the market (see Panels B and D), with over half the strategies displaying significance at the 5% level. Furthermore, the changes in the up- and down-market betas, or the timing ability, captured in the β_{2p}-term are quite large compared to the β_{2p}-values found in Henriksson's (1984) mutual fund study. Notice the results also show some negative market timing, although none were significant. Turning to Table 42b, we find that with the correction for heteroscedasticity the timing during 1966-86 was no longer significant. Again, it is interesting to compare these results with Henriksson's results for U.S. mutual funds. Basically, his results were unaffected by the correction for heteroscedasticity. The results for the 1934-86 full period were mixed. There was little significant timing ability of the active strategies shown by $\hat{\beta}_{2p}$.

Finally, an examination of Table 43a shows that positive timing ability was achieved mostly during the 1966-86 sub-period, while negative timing ability was evident in the 1934-86 period. Correcting for heteroscedasticity, we see virtually no timing ability, positive or negative. This is comparable with the Treynor-Mazuy test results.

C. Concluding Remarks

The results from the investment performance measures are encouraging. All the three measures we calculated show that the active policies managing the twelve industry universe exhibit abnormal investment performance. Specifically, the Jensen Performance Index indicates that the power policies are able to earn abnormal excess returns in many cases, especially when managing the equal-weighted industries. These excess returns reached a maximum of 2.731% per quarter during the 1966-86 period. Even when the industries were value-weighted, abnormal excess returns were earned by most powers.

Turning to the question of market timing, we performed the Treynor-Mazuy and Henriksson-Merton tests of market timing ability, with and without a correction for heteroscedasticity. The uncorrected measures from both tests indicate that some timing ability existed with respect to the powers policies managing the twelve industries during the 1966-86 sub-period. As noted, this contrasts with studies that show no timing ability for mutual fund managers. However, these tests also indicated that some active strategies achieved negative timing. When we corrected for heteroscedasticity, the statistical significance of the powers' market timing ability, both positive and negative, all but disappeared.

VIII. Summary and Extensions

A. Summary of the Methodology

This thesis explored several questions. First, we examined the question of whether multiperiod portfolio theory can be successfully applied beyond the asset allocation stage. We extended the pioneering studies of Grauer and Hakansson to a more micro level, that of industry rotation. We focussed on a base case. This consisted of an investment universe of twelve industries, which followed an industry grouping procedure employed by Breeden, Gibbons and Litzenberger. Furthermore, we followed the Grauer-Hakansson studies and used a 32 quarter simple probability assessment approach to estimate next period's joint return distribution.

Given this base case, we explored a second question: whether the results from the base case are data specific. For this purpose, we employed three sets of investment universes: the base case twelve industry grouping, plus eight and twenty-four industry groupings. Both equal- and value-weighted industries were considered. For these industry universes, we employed the 32 quarter simple probability assessment approach as the estimate of the joint return distribution.

The Grauer-Hakansson studies employed the (naive) simple probability assessment approach to estimating the joint return distribution, and found the approach to be very successful at the asset allocation level. Thus, a third major question examined in the thesis is the efficacy of this simple probability assessment approach. We explored this question by experimenting with different ways of estimating the joint return distribution.

Specifically, we made logical extensions from the base case to examine the questions posed. First, we conducted industry rotation by expanding the investment universe from the twelve industry base case to twenty-four industries, and contracting it to eight. Second, we extended the estimation of the joint return distribution from the most recent 32 quarters of realized returns (the base case) to using the most recent 28 and 40 quarters of past returns. Third, as a further extension of the simple probability assessment approach, which is a "moving window" method, we employed all the historic returns available as the estimate of the joint return distribution. Fourth, we adopted the inflation adapter to the simple probability assessment approach from the Grauer-Hakansson market timing study and applied it to our base case.

Fifth, from these simple extensions and replication of the Grauer-Hakansson methods, we proceeded on a more innovative level. We deviated from the assignment of equal probabilities to the joint return distribution employing a "sum-of-the-digits" rule in assigning the probabilities. This rule assigned larger probabilities to the more recent past realizations than the more distant ones. The idea was drawn from univariate time series modelling. The appeal behind this approach was that the recent past should be a better guide to the next period than the more distant past. We applied this rule to our base case.

Finally, we examined a "disaster states" scenario applied to our base case. Disaster states were appended to the estimates of the joint return distribution and assigned varying probabilities of occurrence. The motivation for this method came from the fact that disasters do occur in the equity markets (e.g., the fourth quarter of 1929, or more recently, the fourth quarter of 1987). Thus, the intention was to keep the investor aware of such states when making his portfolio selection for the next period.

B. Summary of the Results

We examined portfolio rates of return and portfolio compositions over time as a gauge of the success of the active strategies in industry rotation. To further judge the success of these active strategies, we employed several well known measures of investment performance. First, we evaluated the portfolio returns of the active strategies using three standard academic measures of abnormal performance. With the CRSP value-weighted index as the market portfolio, we calculated the Jensen Performance Index, and the Treynor-Mazuy and Henriksson-Merton tests of market timing ability. These investment performance measures were calculated for the base case.

Second, we performed a paired *t*-test that compared the portfolio returns of the active strategies to three sets of benchmarks. These benchmarks were: (i) the passive strategy of holding any one of the value-weighted industry indices; this benchmark was applicable only when the investment universe was a value-weighted one. (ii) A passive strategy that up- and down-levered the CRSP value-weighted index. (iii) A set of semi-passive strategies which up- and down-levered an equally weighted portfolio of the equal-weighted industry indices. This benchmark was applicable only when the investment universe consisted of the equal-weighted industries.

Third, we compared the portfolio returns of the active strategies among themselves when the various techniques were used to estimate the joint return distribution. The test for differences in portfolio returns between two active strategies was the paired *t*-test.

The results of the base case (twelve industries with a 32 quarter simple probability assessment approach) showed that the active strategies performed well in both the full 1934-86 period and in the sub-period 1966-86, achieving economically and statistically significant excess returns in many cases. This was evidenced by the Jensen performance measure in particular. The market timing tests showed that the active strategies, in most cases, displayed an ability to (positively) time the market, although there was little statistical significance when the tests were corrected for heteroscedasticity. Thus, as a first step, the success of multiperiod portfolio theory applied to major asset categories also extends down to a more micro level. This reinforces the conclusions of the earlier Grauer-Hakansson studies. The success in using a naive method to estimate the joint return distribution, in conjunction with the model drawn from multiperiod portfolio theory, questions the existence of (even) weak-form efficient markets.

The robustness of the simple probability assessment approach and of the model applied to portfolio selection is evidenced by the fact that the portfolio returns of the active strategies were, for the most part, not statistically different: (i) when 28, 32 or 40 quarters of realized returns were used to estimate the joint return distribution; and, (ii) when the investment universe was the eight, twelve or twenty-four industry groupings. The efficacy of the simple probability assessment approach is, furthermore, reinforced with the "all-of-history" approach to estimating the joint return distribution. The portfolio returns of the active strategies employing this latter approach showed statistical inferiority over the portfolio returns obtained by the simple probability assessment approach. This was particularly evident for the more risk averse strategies.

The portfolio returns of the active strategies were statistically the same whether the simple probability assessment approach or the inflation adapter approach was employed to estimate the joint return distribution. This is in contrast to the Grauer and Hakansson results which showed the inflation adapter method to be quite successful in timing the market.

The "sum-of-the-digits" method of probability assessment was the only technique found superior (statistically) to the simple probability assessment approach over the full 1934-86 period, especially for the more risk averse investors.

Finally, in the most cases the "disaster states" scenario was not a success, although it did tend to make the choices of the more risk tolerant investors more conservative. While the motivation behind this approach seemed promising, the results did not bear this out. In particular, the rule in assigning probabilities to the "disaster states" was, perhaps, too crude.

C. Extensions for Further Research

The estimation of the joint return distribution clearly offers the most room for future research. A first step would be to combine the "sum-of-the-digits" approach to assigning probabilities with the "all-of-history" approach. This would incorporate the "disaster states" idea and motivation with the success of the "sum-of-the-digits" into one estimation technique.

A major step in the estimation area would be to attempt to begin reducing estimation risk. The logical step would be to employ the Stein estimator and its variants, e.g., Bayes-Stein estimation (see, for example, Jorion (1986)) to the simple probability assessment approach.

A different approach to estimating the joint return distribution is Capital Asset Pricing (CAPM) based. Using the simple probability assessment approach, we could adjust the raw estimates of the distribution using the CAPM. For example, we could estimate the beta of the asset by performing a characteristic line regression on the most recent 32 quarters. An estimate of the market return for the next quarter could be given by the average market return of the last 32 quarters. Because we know the risk-free return for the next quarter, an estimate of next quarter's asset return can be made. Thus, we can shift that asset's realized returns of the past 32 quarters to the new mean return. We could modify the adjustment one step further by adding some multiple of the alpha value from the characteristic line regression to the new mean to reflect the historical under- or over-pricing of the asset.

We have presented three possible extensions to the current study. It is clear that much more can be done to estimate the joint return distribution than have been given here. A completely different extension to all the studies in multiperiod portfolio theory application is to begin considering transactions costs and maintenance margins in the computer programs. It should be interesting to replicate the Grauer-Hakansson studies including these two items to see if the same results are attained and whether it would affect the portfolio choices to any great extent.

Table 1a

Summary Description of the 12 Industry Indices

Industry (SIC Codes)	1/26	1/34	1/66	12/86
	Percent Share of Value (Row 1) Firms (Row 2) — Dates			
Petroleum	14.77	13.20	13.71	9.11
(13,29)	9.04	6.10	3.95	4.52
Finance & Real Estate	1.32	2.77	2.68	16.13
(60-69)	3.21	5.53	6.30	19.81
Consumer Durables	14.33	13.73	16.81	12.64
(0,25,30,36-37,39,50,55,57,99)	14.66	14.47	14.69	14.18
Basic Industries	14.77	20.05	19.32	15.13
(10-12,14,24,26,28,33)	18.67	20.00	17.68	12.65
Food & Tobacco	9.64	12.83	5.72	7.10
(1-2,20-21,54)	12.85	11.77	8.80	4.30
Construction	0.40	1.47	1.68	1.20
(15-17,32,52)	1.00	2.70	4.12	3.75
Capital Goods	4.94	5.74	12.52	11.06
(34-35,38)	7.83	10.07	14.77	11.26
Transportation	19.98	8.72	3.22	1.73
(40-42,44-45,47)	15.66	11.06	5.08	2.71
Utilities	11.39	14.08	18.09	15.05
(46,48-49)	4.82	3.69	10.82	11.12
Textiles & Trade	7.45	6.54	4.98	5.12
(22-23,31,51,53,56,59)	9.24	10.50	9.28	6.81
Services	0.17	0.16	0.23	1.95
(72-73,75-76,80,82,89)	0.60	0.71	0.97	4.24
Leisure	0.85	0.72	1.03	3.77
(27,58,70,78-79)	2.41	3.40	3.55	4.59
Total Value ($ Billion)	27.33	27.98	521.31	2101.61
Total Number of Firms	498	705	1239	1439

Table 1b

Summary Description of the 8 Industry Indices

Industry (SIC Codes)	Percent Share of Value (Row 1) Firms (Row 2) — Dates 1/26	1/34	1/66	12/86
Basic Industries (1000-1299,1400-1499,2600-2699, 2800-2829,2870-2899,3300-3399)	13.90 16.67	18.00 16.88	13.91 13.48	7.38 8.62
Capital Goods (3400-3419,3440-3599,3670-3699, 3800-3849,5080-5089,5100-5129, 7300-7399)	8.29 9.24	7.89 10.92	9.77 15.25	11.11 14.45
Construction (1500-1999,2400-2499,3220-3299, 3430-3439,5160-5219)	0.77 1.00	1.28 2.84	1.70 4.36	1.55 4.17
Consumer Goods (0000-0999,2000-2399,2500-2599, 2700-2799,2830-2869,3000-3219, 3420-3429,3600-3669,3700-3719, 3850-3999,4830-4899,5000-5079, 5090-5099,5130-5159,5220-5999, 7000-7299,7400-9999)	27.24 37.95	32.30 40.43	35.84 38.98	36.84 33.43
Energy (1300-1399,2900-2999)	14.77 9.04	13.20 6.10	13.71 3.95	9.11 4.52
Finance (6000-6999)	1.32 3.21	2.77 5.53	2.68 6.30	16.13 19.81
Transportation (3720-3799,4000-4799)	22.33 18.27	10.49 13.76	4.73 7.67	3.37 4.38
Utilities (4800-4829,4900-4999)	11.38 4.62	14.07 3.55	17.65 10.01	14.50 10.63
Total Value ($ Billion)	27.33	27.98	521.31	2101.61
Total Number of Firms	498	705	1239	1439

Table 1c

Summary Description of the 24 Industry Indices

Industry (SIC Codes)	1/26	1/34	1/66	12/86
	Percent Share of Value (Row 1) Firms (Row 2)			
	Dates			
Banks & Financial Services	0.63	2.37	2.16	13.71
(60-62,67)	1.81	4.40	5.41	17.10
Chemicals, Rubber & Plastics	3.87	10.33	11.90	11.39
(28,30)	6.02	6.67	8.08	6.62
Construction	0.06	0.09	0.06	0.22
(15-17)	0.20	0.71	0.65	1.34
Fabricated Metal Products	1.34	2.27	1.11	1.31
(34)	2.21	2.98	3.23	2.74
Food	6.06	8.02	4.19	5.03
(1-2,20)	8.63	7.80	6.30	2.96
Insurance	0.34	0.26	0.43	2.37
(63-64)	0.60	0.57	0.48	1.69
Machinery	8.40	7.14	18.04	15.43
(35-36,38-39)	8.84	10.78	18.50	15.06
Metals	8.89	8.93	5.67	1.90
(32-33)	10.04	10.21	8.32	4.86
Mining	2.64	2.43	1.59	0.63
(10-12,14)	4.22	4.11	2.67	2.04
Oil & Gas Extraction	0.68	0.20	0.95	3.01
(13)	1.41	0.71	1.45	3.31
Paper & Wood	0.51	0.58	3.41	5.02
(24-27)	1.41	3.55	5.01	5.00
Petroleum & Coal Products	14.09	13.01	12.76	6.16
(29)	7.63	5.39	2.50	1.27

Table 1c (continued)

Summary Description of the 24 Industry Indices

	Percent Share of Value (Row 1) Firms (Row 2)			
	Dates			
Industry (SIC Codes)	1/26	1/34	1/66	12/86
Railroads & Trucking	19.28	8.41	1.99	0.67
(40,42)	12.85	8.37	3.23	1.06
Real Estate	0.35	0.14	0.09	0.14
(65-66)	0.80	0.57	0.40	1.27
Retail Trade, Food	0.40	0.77	0.86	1.43
(54,58)	1.81	2.27	2.10	1.83
Retail Trade, Others	6.22	5.44	3.88	4.34
(52-53,55-57,59)	4.62	5.96	4.68	4.15
Services, Leisure	0.62	0.37	0.27	1.07
(70,78-79)	1.20	1.28	1.37	1.83
Services, Others	0.17	0.16	0.23	1.96
(72-73,75-76,80,82,89)	0.60	0.71	0.97	4.29
Textiles	1.29	1.10	1.12	0.83
(22-23,31)	5.22	4.96	4.85	2.81
Tobacco	3.33	4.13	0.78	1.40
(21)	3.21	2.70	0.97	0.35
Transportation	0.70	0.32	1.23	1.07
(41,44-47)	2.81	2.70	1.86	1.69
Transportation Equipment	8.74	9.40	9.03	4.69
(37)	8.63	7.94	5.17	3.10
Utilities	11.39	14.08	18.10	15.13
(48-49)	4.82	3.69	10.82	11.26
Wholesale Trade	0.02	0.05	0.17	1.08
(50-51)	0.40	0.99	0.97	2.39
Total Value ($ Billion)	27.33	27.98	521.16	2090.26
Total Number of Firms	498	705	1238	1421

Table 2

Industry Categories and Benchmark Portfolios Symbols

12 Industry Universe			
PETR	Petroleum	CAPG	Capital Goods
FINA	Finance & Real Estate	TRAN	Transportation
CDUR	Consumer Durables	UTIL	Utilities
BASI	Basic Industries	TEXT	Textiles & Trade
FTOB	Food & Tobacco	SERV	Services
CONS	Construction	LEIS	Leisure
8 Industry Universe			
BIND	Basic Industries	ENER	Energy
CAGD	Capital Goods	FINA	Finance
CSTR	Construction	TRNS	Transportation
CGDS	Consumer Goods	UTLY	Utilities
24 Industry Universe			
BANK	Banks & Financial Services	RAIL	Railroads & Trucking
CHEM	Chemicals, Rubber & Plastics	REAL	Real Estate
CNST	Construction	RTFD	Retail Trade, Food
FMPS	Fabricated Metal Products	RTOT	Retail Trade, Others
FOOD	Food	SLEI	Services, Leisure
INSU	Insurance	SOTH	Services, Others
MACH	Machinery	TXTL	Textiles
META	Metals	TOBA	Tobacco
MINE	Mining	TRSP	Transportation
OGEX	Oil & Gas Exploration	TEQP	Transportation Equipment
PAPR	Paper & Wood	UTIL	Utilities
PCPS	Petroleum & Coal Products	WHOL	Wholesale Trade
Other Symbols			
RL	Risk-free lending (quarterly U.S. Treasury bills)	IN	U.S. inflation
		B	Borrowing
Benchmark Portfolios			
V10	CRSP value-weighted index	V12	120% in V10, 20% in B
V2	20% in V10, 80% in RL	V14	140% in V10, 40% in B
V4	40% in V10, 60% in RL	V16	160% in V10, 60% in B
V6	60% in V10, 40% in RL	V18	180% in V10, 80% in B
V8	80% in V10, 20% in RL	V20	200% in V10, 100% in B
E10	Equal-weighted portfolio of risky assets	E12	120% in E10, 20% in B
E2	20% in E10, 80% in RL	E14	140% in E10, 40% in B
E4	40% in E10, 60% in RL	E16	160% in E10, 60% in B
E6	60% in E10, 40% in RL	E18	180% in E10, 80% in B
E8	80% in E10, 20% in RL	E20	200% in E10, 100% in B

Table 3a

Geometric Means and Standard Deviations of Annual Returns using 12 Equal-Weighted Industry Indices, with Leverage
(32 quarter estimating period, simple probability assessment)

Portfolio	1934 - 1986 G.Mean	1934 - 1986 S.Dev*	1966 - 1986 G.Mean	1966 - 1986 S.Dev*
Petroleum	14.98	24.21	11.82	27.24
Finance & Real Estate	14.76	25.22	12.45	26.25
Consumer Durables	15.12	28.04	13.42	28.12
Basic Industries	14.60	21.38	12.69	17.41
Food & Tobacco	14.58	19.78	16.02	20.99
Construction	13.70	26.80	12.97	24.84
Capital Goods	14.58	25.54	11.88	25.02
Transportation	14.22	29.43	10.97	24.40
Utilities	13.22	23.05	12.13	17.33
Textiles & Trade	14.81	28.26	14.18	31.28
Services	16.40	32.39	14.22	32.55
Leisure	15.64	30.40	15.50	30.15
Risk-Free	3.76	3.47	7.49	2.71
Inflation	4.09	3.80	6.12	3.15
Power -75	4.70	4.18	7.93	2.88
Power -50	5.14	5.06	8.14	3.12
Power -30	6.01	6.98	8.55	3.76
Power -15	7.38	9.72	9.51	5.82
Power -10	8.65	11.50	10.37	7.98
Power -5	10.80	15.08	12.32	13.78
Power -2	13.86	21.32	15.27	22.27
Power 0	18.28	33.36	19.05	33.96
Power 0.5	18.01	44.78	15.44	39.57
Power 1	16.91	54.86	14.97	46.38
Portfolio E2	6.47	5.40	9.20	5.11
Portfolio E4	8.99	9.72	10.69	9.38
Portfolio E6	11.31	14.39	11.95	13.89
Portfolio E8	13.42	19.14	12.97	18.49
Portfolio E10	15.31	23.96	13.75	23.15
Portfolio E12	16.56	28.80	13.67	27.95
Portfolio E14	17.77	33.41	13.95	32.15
Portfolio E16	18.61	37.35	14.10	35.44
Portfolio E18	19.29	41.08	14.26	37.98
Portfolio E20	20.18	43.74	14.27	40.71
Portfolio V2	5.47	4.24	8.12	3.99
Portfolio V4	7.07	6.99	8.62	6.87
Portfolio V6	8.56	10.24	9.01	10.08
Portfolio V8	9.94	13.66	9.26	13.42
Portfolio V10	11.21	17.16	9.38	16.84
Portfolio V12	11.93	20.69	8.77	20.39
Portfolio V14	12.65	24.15	8.43	23.79
Portfolio V16	13.18	27.11	8.12	26.87
Portfolio V18	13.57	30.00	7.74	29.78
Portfolio V20	14.04	32.34	7.15	32.90

*Standard Deviation is for the variable ln(1+r).

Table 3b

Geometric Means and Standard Deviations of Annual Returns using 12 Equal-Weighted Industry Indices, without Leverage
(32 quarter estimating period, simple probability assessment)

Portfolio	1934 - 1986 G.Mean	1934 - 1986 S.Dev*	1966 - 1986 G.Mean	1966 - 1986 S.Dev*
Petroleum	14.98	24.21	11.82	27.24
Finance & Real Estate	14.76	25.22	12.45	26.25
Consumer Durables	15.12	28.04	13.42	28.12
Basic Industries	14.60	21.38	12.69	17.41
Food & Tobacco	14.58	19.78	16.02	20.99
Construction	13.70	26.80	12.97	24.84
Capital Goods	14.58	25.54	11.88	25.02
Transportation	14.22	29.43	10.97	24.40
Utilities	13.22	23.05	12.13	17.33
Textiles & Trade	14.81	28.26	14.18	31.28
Services	16.40	32.39	14.22	32.55
Leisure	15.64	30.40	15.50	30.15
Risk-Free	3.76	3.47	7.49	2.71
Inflation	4.09	3.80	6.12	3.15
Power -75	4.70	4.18	7.93	2.88
Power -50	5.14	5.06	8.14	3.12
Power -30	6.01	6.98	8.55	3.76
Power -15	7.31	8.12	9.51	5.82
Power -10	8.26	9.31	10.37	7.98
Power -5	10.15	13.03	12.34	13.79
Power -2	12.23	17.24	14.46	19.05
Power 0	13.84	24.89	15.14	26.05
Power 0.5	13.88	26.77	14.88	26.19
Power 1	13.18	28.67	14.42	26.17
Portfolio E2	6.47	5.40	9.20	5.11
Portfolio E4	8.99	9.72	10.69	9.38
Portfolio E6	11.31	14.39	11.95	13.89
Portfolio E8	13.42	19.14	12.97	18.49
Portfolio E10	15.31	23.96	13.75	23.15
Portfolio V2	5.47	4.24	8.12	3.99
Portfolio V4	7.07	6.99	8.62	6.87
Portfolio V6	8.56	10.24	9.01	10.08
Portfolio V8	9.94	13.66	9.26	13.42
Portfolio V10	11.21	17.16	9.38	16.84

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 4a

Geometric Means and Standard Deviations of Annual Returns using 12 Value-Weighted Industry Indices, with Leverage
(32 quarter estimating period, simple probability assessment)

Portfolio	1934 - 1986 G.Mean	1934 - 1986 S.Dev*	1966 - 1986 G.Mean	1966 - 1986 S.Dev*
Petroleum	12.20	18.96	10.93	21.21
Finance & Real Estate	12.08	20.29	10.68	18.75
Consumer Durables	11.82	23.87	8.17	23.83
Basic Industries	10.95	17.67	8.58	15.15
Food & Tobacco	11.44	16.17	12.96	17.39
Construction	9.61	21.91	7.99	22.18
Capital Goods	11.73	20.74	7.92	20.54
Transportation	9.31	22.73	7.03	20.85
Utilities	10.33	15.50	9.68	13.69
Textiles & Trade	11.28	22.98	9.60	26.96
Services	12.75	31.39	10.67	28.10
Leisure	12.64	28.62	12.32	30.18
Risk-Free	3.76	3.47	7.49	2.71
Inflation	4.09	3.80	6.12	3.15
Power -75	4.87	4.65	7.81	2.90
Power -50	5.40	5.92	7.96	3.12
Power -30	6.12	7.87	8.25	3.73
Power -15	7.26	10.96	8.93	5.62
Power -10	7.82	12.91	9.52	7.59
Power -5	9.29	16.29	10.39	12.16
Power -2	11.63	21.74	11.31	19.52
Power 0	13.61	32.77	9.34	30.29
Power 0.5	13.95	43.48	8.87	35.97
Power 1	11.75	56.15	0.02	49.37
Portfolio V2	5.47	4.24	8.12	3.99
Portfolio V4	7.07	6.99	8.62	6.87
Portfolio V6	8.56	10.24	9.01	10.08
Portfolio V8	9.94	13.66	9.26	13.42
Portfolio V10	11.21	17.16	9.38	16.84
Portfolio V12	11.93	20.69	8.77	20.39
Portfolio V14	12.65	24.15	8.43	23.79
Portfolio V16	13.18	27.11	8.12	26.87
Portfolio V18	13.57	30.00	7.74	29.78
Portfolio V20	14.04	32.34	7.15	32.90

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 4b

Geometric Means and Standard Deviations of Annual Returns using 12 Value-Weighted Industry Indices, without Leverage (32 quarter estimating period, simple probability assessment)

Portfolio	1934 - 1986 G.Mean	1934 - 1986 S.Dev*	1966 - 1986 G.Mean	1966 - 1986 S.Dev*
Petroleum	12.20	18.96	10.93	21.21
Finance & Real Estate	12.08	20.29	10.68	18.75
Consumer Durables	11.82	23.87	8.17	23.83
Basic Industries	10.95	17.67	8.58	15.15
Food & Tobacco	11.44	16.17	12.96	17.39
Construction	9.61	21.91	7.99	22.18
Capital Goods	11.73	20.74	7.92	20.54
Transportation	9.31	22.73	7.03	20.85
Utilities	10.33	15.50	9.68	13.69
Textiles & Trade	11.28	22.98	9.60	26.96
Services	12.75	31.39	10.67	28.10
Leisure	12.64	28.62	12.32	30.18
Risk-Free	3.76	3.47	7.49	2.71
Inflation	4.09	3.80	6.12	3.15
Power -75	4.87	4.65	7.81	2.90
Power -50	5.40	5.92	7.96	3.12
Power -30	6.12	7.87	8.25	3.73
Power -15	6.81	9.07	8.93	5.62
Power -10	7.45	10.33	9.52	7.59
Power -5	8.87	13.41	10.29	12.01
Power -2	9.82	16.93	10.61	16.92
Power 0	10.59	25.15	8.23	23.87
Power 0.5	10.29	28.37	6.64	28.39
Power 1	10.22	31.24	3.85	33.66
Portfolio V2	5.47	4.24	8.12	3.99
Portfolio V4	7.07	6.99	8.62	6.87
Portfolio V6	8.56	10.24	9.01	10.08
Portfolio V8	9.94	13.66	9.26	13.42
Portfolio V10	11.21	17.16	9.38	16.84

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 5a

Geometric Means and Standard Deviations of Annual Returns using 8 Equal-Weighted Industry Indices, with Leverage
(32 quarter estimating period, simple probability assessment)

Portfolio	1934 - 1986 G.Mean	1934 - 1986 S.Dev*	1966 - 1986 G.Mean	1966 - 1986 S.Dev*
Basic Industries	14.33	22.29	12.14	18.59
Capital Goods	14.49	25.63	11.87	25.74
Construction	13.44	28.93	12.17	25.03
Consumer Goods	15.22	24.83	14.79	26.01
Energy	14.98	24.21	11.82	27.24
Finance	14.76	25.22	12.45	26.25
Transportation	14.77	28.33	11.92	26.08
Utilities	12.89	23.16	11.59	16.69
Risk-Free	3.76	3.47	7.49	2.71
Inflation	4.09	3.80	6.12	3.15
Power -75	4.56	3.75	7.89	2.78
Power -50	4.94	4.22	8.09	2.96
Power -30	5.67	5.51	8.47	3.52
Power -15	7.20	8.18	9.36	5.42
Power -10	8.39	10.32	10.17	7.47
Power -5	10.70	14.20	12.06	13.11
Power -2	13.60	19.67	14.48	20.82
Power 0	16.93	29.54	18.33	32.51
Power 0.5	15.86	40.06	13.17	39.24
Power 1	14.07	56.51	13.36	47.46
Portfolio E2	6.39	5.20	8.98	4.75
Portfolio E4	8.81	9.36	10.28	8.67
Portfolio E6	11.04	13.88	11.37	12.85
Portfolio E8	13.07	18.49	12.25	17.10
Portfolio E10	14.87	23.14	12.92	21.41
Portfolio E12	16.06	27.80	12.76	25.82
Portfolio E14	17.19	32.24	12.95	29.62
Portfolio E16	17.94	36.08	13.02	32.69
Portfolio E18	18.49	39.81	13.03	35.33
Portfolio E20	19.22	42.51	12.87	38.16
Portfolio V2	5.47	4.24	8.12	3.99
Portfolio V4	7.07	6.99	8.62	6.87
Portfolio V6	8.56	10.24	9.01	10.08
Portfolio V8	9.94	13.66	9.26	13.42
Portfolio V10	11.21	17.16	9.38	16.84
Portfolio V12	11.93	20.69	8.77	20.39
Portfolio V14	12.65	24.15	8.43	23.79
Portfolio V16	13.18	27.11	8.12	26.87
Portfolio V18	13.57	30.00	7.74	29.78
Portfolio V20	14.04	32.34	7.15	32.90

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 5b

Geometric Means and Standard Deviations of Annual Returns using 8 Equal-Weighted Industry Indices, without Leverage
(32 quarter estimating period, simple probability assessment)

	1934 - 1986		1966 - 1986	
Portfolio	G.Mean	S.Dev*	G.Mean	S.Dev*
Basic Industries	14.33	22.29	12.14	18.59
Capital Goods	14.49	25.63	11.87	25.74
Construction	13.44	28.93	12.17	25.03
Consumer Goods	15.22	24.83	14.79	26.01
Energy	14.98	24.21	11.82	27.24
Finance	14.76	25.22	12.45	26.25
Transportation	14.77	28.33	11.92	26.08
Utilities	12.89	23.16	11.59	16.69
Risk-Free	3.76	3.47	7.49	2.71
Inflation	4.09	3.80	6.12	3.15
Power -75	4.56	3.75	7.89	2.78
Power -50	4.94	4.22	8.09	2.96
Power -30	5.67	5.51	8.47	3.52
Power -15	7.27	7.75	9.36	5.42
Power -10	8.19	8.80	10.17	7.47
Power -5	10.08	12.39	12.06	13.10
Power -2	11.78	15.84	13.98	18.59
Power 0	13.08	22.50	14.31	24.81
Power 0.5	13.64	25.54	13.75	25.12
Power 1	13.05	28.67	13.35	26.38
Portfolio E2	6.39	5.20	8.98	4.75
Portfolio E4	8.81	9.36	10.28	8.67
Portfolio E6	11.04	13.88	11.37	12.85
Portfolio E8	13.07	18.49	12.25	17.10
Portfolio E10	14.87	23.14	12.92	21.41
Portfolio V2	5.47	4.24	8.12	3.99
Portfolio V4	7.07	6.99	8.62	6.87
Portfolio V6	8.56	10.24	9.01	10.08
Portfolio V8	9.94	13.66	9.26	13.42
Portfolio V10	11.21	17.16	9.38	16.84

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 5c

Geometric Means and Standard Deviations of Annual Returns using 8 Value-Weighted Industry Indices, with Leverage
(32 quarter estimating period, simple probability assessment)

Portfolio	1934 - 1986 G.Mean	1934 - 1986 S.Dev*	1966 - 1986 G.Mean	1966 - 1986 S.Dev*
Basic Industries	10.37	19.04	7.54	17.58
Capital Goods	11.66	19.63	8.56	20.06
Construction	9.30	24.52	7.44	21.51
Consumer Goods	11.66	19.47	9.71	20.12
Energy	12.30	18.96	10.93	21.21
Finance	12.08	20.29	10.68	18.75
Transportation	9.97	23.10	8.07	23.07
Utilities	10.23	15.40	9.52	13.47
Risk-Free	3.76	3.47	7.49	2.71
Inflation	4.09	3.80	6.12	3.15
Power -75	4.54	3.91	7.64	2.78
Power -50	4.91	4.58	7.72	2.89
Power -30	5.62	6.32	7.86	3.21
Power -15	6.75	8.84	8.19	4.36
Power -10	7.62	11.09	8.47	5.69
Power -5	9.27	14.12	8.99	9.35
Power -2	10.94	18.42	8.76	14.56
Power 0	11.50	25.26	6.82	24.92
Power 0.5	10.91	31.25	7.59	29.21
Power 1	8.77	47.42	5.30	32.22
Portfolio V2	5.47	4.24	8.12	3.99
Portfolio V4	7.07	6.99	8.62	6.87
Portfolio V6	8.56	10.24	9.01	10.08
Portfolio V8	9.94	13.66	9.26	13.42
Portfolio V10	11.21	17.16	9.38	16.84
Portfolio V12	11.93	20.69	8.77	20.39
Portfolio V14	12.65	24.15	8.43	23.79
Portfolio V16	13.18	27.11	8.12	26.87
Portfolio V18	13.57	30.00	7.74	29.78
Portfolio V20	14.04	32.34	7.15	32.90

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 5d

Geometric Means and Standard Deviations of Annual Returns using 8 Value-Weighted Industry Indices, without Leverage
(32 quarter estimating period, simple probability assessment)

	1934 - 1986		1966 - 1986	
Portfolio	G.Mean	S.Dev*	G.Mean	S.Dev*
Basic Industries	10.37	19.04	7.54	17.58
Capital Goods	11.66	19.63	8.56	20.06
Construction	9.30	24.52	7.44	21.51
Consumer Goods	11.66	19.47	9.71	20.12
Energy	12.30	18.96	10.93	21.21
Finance	12.08	20.29	10.68	18.75
Transportation	9.97	23.10	8.07	23.07
Utilities	10.23	15.40	9.52	13.47
Risk-Free	3.76	3.47	7.49	2.71
Inflation	4.09	3.80	6.12	3.15
Power -75	4.54	3.91	7.64	2.78
Power -50	4.91	4.58	7.72	2.89
Power -30	5.62	6.32	7.86	3.21
Power -15	6.72	8.10	8.19	4.36
Power -10	7.35	9.07	8.47	5.69
Power -5	8.50	11.40	8.97	9.32
Power -2	9.25	13.86	8.74	13.59
Power 0	8.60	18.40	6.22	19.92
Power 0.5	8.37	21.84	6.46	22.18
Power 1	8.92	24.82	6.46	23.15
Portfolio V2	5.47	4.24	8.12	3.99
Portfolio V4	7.07	6.99	8.62	6.87
Portfolio V6	8.56	10.24	9.01	10.08
Portfolio V8	9.94	13.66	9.26	13.42
Portfolio V10	11.21	17.16	9.38	16.84

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 6a

Geometric Means and Standard Deviations of Annual Returns using 24 Equal-Weighted Industry Indices, with Leverage (32 quarter estimating period, simple probability assessment)

Portfolio	1934 - 1986 G.Mean	1934 - 1986 S.Dev*	1966 - 1986 G.Mean	1966 - 1986 S.Dev*
Banks & Financial Services	14.49	25.48	11.96	25.85
Chemicals, Rubber & Plastics	14.61	20.11	13.90	17.75
Construction	13.78	41.87	15.90	30.50
Fabricated Metal Products	14.00	25.33	14.08	23.51
Food	14.70	19.92	16.08	20.78
Insurance	14.11	21.00	16.26	25.59
Machinery	14.71	26.25	11.79	26.85
Metals	12.97	24.19	10.37	20.03
Mining	14.22	25.41	11.74	26.79
Oil & Gas Exploration	16.04	30.17	11.03	31.31
Paper & Wood	16.35	24.83	14.04	21.87
Petroleum & Coal Products	15.73	22.11	14.49	24.01
Railroads & Trucking	14.19	30.94	13.40	24.99
Real Estate	14.22	32.67	11.45	35.91
Retail Trade, Food	13.86	26.35	13.15	27.42
Retail Trade, Others	15.49	29.12	14.89	31.88
Services, Leisure	16.99	34.47	18.15	38.13
Services, Others	16.40	32.39	14.22	32.55
Textiles	13.81	29.03	13.11	32.10
Tobacco	15.03	20.20	19.67	21.02
Transportation	14.40	30.47	8.32	27.37
Transportation Equipment	15.11	29.07	13.74	29.08
Utilities	13.22	23.05	12.15	17.34
Wholesale Trade	16.61	28.89	14.70	27.05
Risk-Free	3.76	3.47	7.49	2.71
Inflation	4.09	3.80	6.12	3.15
Power -75	5.00	5.32	8.21	3.07
Power -50	5.55	6.93	8.56	3.42
Power -30	6.47	8.57	9.23	4.32
Power -15	8.01	12.23	10.80	6.89
Power -10	9.21	14.15	12.20	9.46
Power -5	11.56	17.64	14.47	14.88
Power -2	15.27	23.22	17.42	22.89
Power 0	16.09	33.09	10.15	31.41
Power 0.5	12.95	47.14	2.65	43.12
Power 1	9.46	58.19	-6.88	54.92
Portfolio E2	6.47	5.40	9.20	5.11
Portfolio E4	8.99	9.72	10.69	9.38
Portfolio E6	11.31	14.39	11.95	13.89
Portfolio E8	13.42	19.14	12.97	18.49
Portfolio E10	15.31	23.96	13.75	23.15
Portfolio E12	16.56	28.80	13.67	27.95
Portfolio E14	17.77	33.41	13.95	32.15
Portfolio E16	18.61	37.35	14.10	35.44
Portfolio E18	19.29	41.08	14.26	37.98
Portfolio E20	20.18	43.74	14.27	40.71

*Standard Deviation is for the variable ln(1+r).

Table 6b

Geometric Means and Standard Deviations of Annual Returns using 24 Equal-Weighted Industry Indices, without Leverage
(32 quarter estimating period, simple probability assessment)

Portfolio	1934 - 1986 G.Mean	S.Dev*	1966 - 1986 G.Mean	S.Dev*
Banks & Financial Services	14.49	25.48	11.96	25.85
Chemicals, Rubber & Plastics	14.61	20.11	13.90	17.75
Construction	13.78	41.87	15.90	30.50
Fabricated Metal Products	14.00	25.33	14.08	23.51
Food	14.70	19.92	16.08	20.78
Insurance	14.11	21.00	16.26	25.59
Machinery	14.71	26.25	11.79	26.85
Metals	12.97	24.19	10.37	20.03
Mining	14.22	25.41	11.74	26.79
Oil & Gas Exploration	16.04	30.17	11.03	31.31
Paper & Wood	16.35	24.83	14.04	21.87
Petroleum & Coal Products	15.73	22.11	14.49	24.01
Railroads & Trucking	14.19	30.94	13.40	24.99
Real Estate	14.22	32.67	11.45	35.91
Retail Trade, Food	13.86	26.35	13.15	27.42
Retail Trade, Others	15.49	29.12	14.89	31.88
Services, Leisure	16.99	34.47	18.15	38.13
Services, Others	16.40	32.39	14.22	32.55
Textiles	13.81	29.03	13.11	32.10
Tobacco	15.03	20.20	19.67	21.02
Transportation	14.40	30.47	8.32	27.37
Transportation Equipment	15.11	29.07	13.74	29.08
Utilities	13.22	23.05	12.15	17.34
Wholesale Trade	16.61	28.89	14.70	27.05
Risk-Free	3.76	3.47	7.49	2.71
Inflation	4.09	3.80	6.12	3.15
Power -75	5.00	5.32	8.21	3.07
Power -50	5.55	6.93	8.56	3.42
Power -30	6.44	8.46	9.23	4.32
Power -15	7.72	9.90	10.80	6.89
Power -10	8.77	11.32	12.20	9.46
Power -5	10.73	14.15	13.54	13.77
Power -2	12.07	17.01	12.93	17.22
Power 0	12.60	24.28	9.27	25.16
Power 0.5	11.53	28.91	5.41	27.60
Power 1	11.11	30.87	2.57	30.05
Portfolio E2	6.47	5.40	9.20	5.11
Portfolio E4	8.99	9.72	10.69	9.38
Portfolio E6	11.31	14.39	11.95	13.89
Portfolio E8	13.42	19.14	12.97	18.49
Portfolio E10	15.31	23.96	13.75	23.15

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 6c

Geometric Means and Standard Deviations of Annual Returns using 24 Value-Weighted Industry Indices, with Leverage (32 quarter estimating period, simple probability assessment)

Portfolio	1934 - 1986 G.Mean	1934 - 1986 S.Dev*	1966 - 1986 G.Mean	1966 - 1986 S.Dev*
Banks & Financial Services	12.12	21.54	10.41	19.11
Chemicals, Rubber & Plastics	11.15	16.38	9.18	15.75
Construction	10.97	35.19	8.24	32.90
Fabricated Metal Products	9.68	21.19	9.68	18.53
Food	11.58	16.74	12.66	19.29
Insurance	11.49	16.88	11.92	19.41
Machinery	11.93	20.69	7.84	21.06
Metals	9.57	21.69	6.03	17.25
Mining	8.86	20.55	4.70	22.94
Oil & Gas Exploration	13.78	24.93	11.23	25.55
Paper & Wood	12.87	21.97	10.30	18.06
Petroleum & Coal Products	12.64	18.80	11.79	20.97
Railroads & Trucking	10.04	22.44	10.02	20.78
Real Estate	11.84	30.56	9.70	37.99
Retail Trade, Food	11.96	22.92	10.99	23.97
Retail Trade, Others	11.40	23.06	9.42	27.04
Services, Leisure	13.86	33.08	15.18	38.91
Services, Others	12.75	31.39	10.67	28.10
Textiles	10.52	26.16	10.15	31.59
Tobacco	12.01	17.70	16.45	14.20
Transportation	10.21	27.77	4.24	27.38
Transportation Equipment	12.02	26.71	7.96	26.36
Utilities	10.33	15.50	9.68	13.70
Wholesale Trade	12.52	25.09	12.64	25.78
Risk-Free	3.76	3.47	7.49	2.71
Inflation	4.09	3.80	6.12	3.15
Power -75	5.35	6.94	7.76	2.90
Power -50	5.67	7.88	7.89	3.13
Power -30	6.17	9.92	8.13	3.78
Power -15	7.27	13.54	8.65	5.78
Power -10	7.97	15.09	9.06	7.78
Power -5	9.05	17.52	9.32	12.17
Power -2	9.95	23.05	7.80	19.76
Power 0	7.51	39.74	2.13	42.01
Power 0.5	6.73	52.02	-0.95	55.22
Power 1	2.98	65.22	-11.21	72.81
Portfolio V2	5.47	4.24	8.12	3.99
Portfolio V4	7.07	6.99	8.62	6.87
Portfolio V6	8.56	10.24	9.01	10.08
Portfolio V8	9.94	13.66	9.26	13.42
Portfolio V10	11.21	17.16	9.38	16.84
Portfolio V12	11.93	20.69	8.77	20.39
Portfolio V14	12.65	24.15	8.43	23.79
Portfolio V16	13.18	27.11	8.12	26.87
Portfolio V18	13.57	30.00	7.74	29.78
Portfolio V20	14.04	32.34	7.15	32.90

*Standard Deviation is for the variable ln(1+r).

Table 6d

Geometric Means and Standard Deviations of Annual Returns using 24 Value-Weighted Industry Indices, without Leverage
(32 quarter estimating period, simple probability assessment)

Portfolio	1934 - 1986 G.Mean	S.Dev*	1966 - 1986 G.Mean	S.Dev*
Banks & Financial Services	12.12	21.54	10.41	19.11
Chemicals, Rubber & Plastics	11.15	16.38	9.18	15.75
Construction	10.97	35.19	8.24	32.90
Fabricated Metal Products	9.68	21.19	9.68	18.53
Food	11.58	16.74	12.66	19.29
Insurance	11.49	16.88	11.92	19.41
Machinery	11.93	20.69	7.84	21.06
Metals	9.57	21.69	6.03	17.25
Mining	8.86	20.55	4.70	22.94
Oil & Gas Exploration	13.78	24.93	11.23	25.55
Paper & Wood	12.87	21.97	10.30	18.06
Petroleum & Coal Products	12.64	18.80	11.79	20.97
Railroads & Trucking	10.04	22.44	10.02	20.78
Real Estate	11.84	30.56	9.70	37.99
Retail Trade, Food	11.96	22.92	10.99	23.97
Retail Trade, Others	11.40	23.06	9.42	27.04
Services, Leisure	13.86	33.08	15.18	38.91
Services, Others	12.75	31.39	10.67	28.10
Textiles	10.52	26.16	10.15	31.59
Tobacco	12.01	17.70	16.45	14.20
Transportation	10.21	27.77	4.24	27.38
Transportation Equipment	12.02	26.71	7.96	26.36
Utilities	10.33	15.50	9.68	13.70
Wholesale Trade	12.52	25.09	12.64	25.78
Risk-Free	3.76	3.47	7.49	2.71
Inflation	4.09	3.80	6.12	3.15
Power -75	5.35	6.94	7.76	2.90
Power -50	5.67	7.88	7.89	3.13
Power -30	5.98	9.14	8.13	3.78
Power -15	6.77	10.17	8.65	5.78
Power -10	7.31	11.30	9.06	7.78
Power -5	8.56	13.25	9.15	11.36
Power -2	8.22	18.47	7.80	18.28
Power 0	7.80	29.63	4.22	32.90
Power 0.5	8.08	31.53	3.49	33.64
Power 1	7.22	31.68	1.63	34.94
Portfolio V2	5.47	4.24	8.12	3.99
Portfolio V4	7.07	6.99	8.62	6.87
Portfolio V6	8.56	10.24	9.01	10.08
Portfolio V8	9.94	13.66	9.26	13.42
Portfolio V10	11.21	17.16	9.38	16.84

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 7a

Geometric Means and Standard Deviations of Annual Returns using 12 Equal-Weighted Industry Indices, with Leverage, 1936-86: 32, 28 and 40 Quarter Estimating Periods (simple probability assessment)

Portfolio	32 Quarter G.Mean	32 Quarter S.Dev*	28 Quarter G.Mean	28 Quarter S.Dev*	40 Quarter G.Mean	40 Quarter S.Dev*
Petroleum	14.38	23.87	14.38	23.87	14.38	23.87
Finance & Real Estate	13.83	25.07	13.83	25.07	13.83	25.07
Consumer Durables	14.06	27.88	14.06	27.88	14.06	27.88
Basic Industries	13.80	21.36	13.80	21.36	13.80	21.36
Food & Tobacco	14.13	20.06	14.13	20.06	14.13	20.06
Construction	13.14	26.86	13.14	26.86	13.14	26.86
Capital Goods	12.96	24.72	12.96	24.72	12.96	24.72
Transportation	14.04	29.70	14.04	29.70	14.04	29.70
Utilities	12.66	21.58	12.66	21.58	12.66	21.58
Textiles & Trade	13.92	28.53	13.92	28.53	13.92	28.53
Services	15.44	32.39	15.44	32.39	15.44	32.39
Leisure	14.66	30.67	14.66	30.67	14.66	30.67
Risk-Free	3.90	3.47	3.90	3.47	3.90	3.47
Inflation	4.16	3.86	4.16	3.86	4.16	3.86
Power -75	4.86	4.18	5.12	4.30	4.70	3.77
Power -50	5.32	5.08	5.70	5.38	5.08	4.31
Power -30	6.22	7.05	6.69	7.58	5.80	5.79
Power -15	7.62	9.84	8.41	10.79	7.25	8.39
Power -10	8.92	11.66	9.61	12.85	8.43	9.67
Power -5	11.09	15.31	12.10	17.36	10.69	13.51
Power -2	14.13	21.70	15.35	24.91	13.74	20.52
Power 0	18.07	33.95	15.85	36.33	16.01	33.83
Power 0.5	16.99	45.29	14.93	47.74	14.89	44.74
Power 1	15.07	55.11	17.48	55.84	14.63	52.64
Portfolio E2	6.40	5.45	6.40	5.45	6.40	5.45
Portfolio E4	8.72	9.72	8.72	9.72	8.72	9.72
Portfolio E6	10.84	14.34	10.84	14.34	10.84	14.34
Portfolio E8	12.76	19.07	12.76	19.07	12.76	19.07
Portfolio E10	14.48	23.88	14.48	23.88	14.48	23.88
Portfolio E12	15.56	28.72	15.56	28.72	15.56	28.72
Portfolio E14	16.63	33.34	16.63	33.34	16.63	33.34
Portfolio E16	17.33	37.26	17.33	37.26	17.33	37.26
Portfolio E18	17.88	40.98	17.88	40.98	17.88	40.98
Portfolio E20	18.68	43.60	18.68	43.60	18.68	43.60
Portfolio V2	5.49	4.26	5.49	4.26	5.49	4.26
Portfolio V4	6.98	6.99	6.98	6.99	6.98	6.99
Portfolio V6	8.36	10.21	8.36	10.21	8.36	10.21
Portfolio V8	9.62	13.59	9.62	13.59	9.62	13.59
Portfolio V10	10.78	17.08	10.78	17.08	10.78	17.08
Portfolio V12	11.39	20.60	11.39	20.60	11.39	20.60
Portfolio V14	12.00	24.05	12.00	24.05	12.00	24.05
Portfolio V16	12.41	26.98	12.41	26.98	12.41	26.98
Portfolio V18	12.71	29.83	12.71	29.83	12.71	29.83
Portfolio V20	13.08	32.13	13.08	32.13	13.08	32.13

*Standard Deviation is for the variable ln(1+r).

Table 7b

Geometric Means and Standard Deviations of Annual Returns using 12 Equal-Weighted Industry Indices, with Leverage, 1966-86: 32, 28 and 40 Quarter Estimating Periods (simple probability assessment)

Portfolio	32 Quarter G.Mean	32 Quarter S.Dev*	28 Quarter G.Mean	28 Quarter S.Dev*	40 Quarter G.Mean	40 Quarter S.Dev*
Petroleum	11.82	27.24	11.82	27.24	11.82	27.24
Finance & Real Estate	12.45	26.25	12.45	26.25	12.45	26.25
Consumer Durables	13.42	28.12	13.42	28.12	13.42	28.12
Basic Industries	12.69	17.41	12.69	17.41	12.69	17.41
Food & Tobacco	16.02	20.99	16.02	20.99	16.02	20.99
Construction	12.97	24.84	12.97	24.84	12.97	24.84
Capital Goods	11.88	25.02	11.88	25.02	11.88	25.02
Transportation	10.97	24.40	10.97	24.40	10.97	24.40
Utilities	12.13	17.33	12.13	17.33	12.13	17.33
Textiles & Trade	14.18	31.28	14.18	31.28	14.18	31.28
Services	14.22	32.55	14.22	32.55	14.22	32.55
Leisure	15.50	30.15	15.50	30.15	15.50	30.15
Risk-Free	7.49	2.71	7.49	2.71	7.49	2.71
Inflation	6.12	3.15	6.12	3.15	6.12	3.15
Power -75	7.93	2.88	7.86	2.99	7.81	2.75
Power -50	8.14	3.12	8.04	3.31	7.96	2.91
Power -30	8.55	3.76	8.39	4.16	8.26	3.43
Power -15	9.51	5.82	9.16	6.70	8.95	5.23
Power -10	10.37	7.98	9.83	9.32	9.55	7.19
Power -5	12.32	13.78	11.52	16.18	10.62	12.19
Power -2	15.27	22.27	13.83	25.07	12.62	20.90
Power 0	19.05	33.96	14.52	35.51	14.21	33.83
Power 0.5	15.44	39.57	14.57	38.40	11.87	41.06
Power 1	14.97	46.38	15.69	44.18	13.96	49.14
Portfolio E2	9.20	5.11	9.20	5.11	9.20	5.11
Portfolio E4	10.69	9.38	10.69	9.38	10.69	9.38
Portfolio E6	11.95	13.89	11.95	13.89	11.95	13.89
Portfolio E8	12.97	18.49	12.97	18.49	12.97	18.49
Portfolio E10	13.75	23.15	13.75	23.15	13.75	23.15
Portfolio E12	13.67	27.95	13.67	27.95	13.67	27.95
Portfolio E14	13.95	32.15	13.95	32.15	13.95	32.15
Portfolio E16	14.10	35.44	14.10	35.44	14.10	35.44
Portfolio E18	14.26	37.98	14.26	37.98	14.26	37.98
Portfolio E20	14.27	40.71	14.27	40.71	14.27	40.71
Portfolio V2	8.12	3.99	8.12	3.99	8.12	3.99
Portfolio V4	8.62	6.87	8.62	6.87	8.62	6.87
Portfolio V6	9.01	10.08	9.01	10.08	9.01	10.08
Portfolio V8	9.26	13.42	9.26	13.42	9.26	13.42
Portfolio V10	9.38	16.84	9.38	16.84	9.38	16.84
Portfolio V12	8.77	20.39	8.77	20.39	8.77	20.39
Portfolio V14	8.43	23.79	8.43	23.79	8.43	23.79
Portfolio V16	8.12	26.87	8.12	26.87	8.12	26.87
Portfolio V18	7.74	29.78	7.74	29.78	7.74	29.78
Portfolio V20	7.15	32.90	7.15	32.90	7.15	32.90

*Standard Deviation is for the variable ln(1+r).

Table 7c

Geometric Means and Standard Deviations of Annual Returns using 12 Equal-Weighted Industry Indices, without Leverage, 1934-86: 32, 28 and 40 Quarter Estimating Periods (simple probability assessment)

Portfolio	32 Quarter G.Mean	32 Quarter S.Dev*	28 Quarter G.Mean	28 Quarter S.Dev*	40 Quarter G.Mean	40 Quarter S.Dev*
Petroleum	14.38	23.87	14.38	23.87	14.38	23.87
Finance & Real Estate	13.83	25.07	13.83	25.07	13.83	25.07
Consumer Durables	14.06	27.88	14.06	27.88	14.06	27.88
Basic Industries	13.80	21.36	13.80	21.36	13.80	21.36
Food & Tobacco	14.13	20.06	14.13	20.06	14.13	20.06
Construction	13.14	26.86	13.14	26.86	13.14	26.86
Capital Goods	12.96	24.72	12.96	24.72	12.96	24.72
Transportation	14.04	29.70	14.04	29.70	14.04	29.70
Utilities	12.66	21.58	12.66	21.58	12.66	21.58
Textiles & Trade	13.92	28.53	13.92	28.53	13.92	28.53
Services	15.44	32.39	15.44	32.39	15.44	32.39
Leisure	14.66	30.67	14.66	30.67	14.66	30.67
Risk-Free	3.90	3.47	3.90	3.47	3.90	3.47
Inflation	4.16	3.86	4.16	3.86	4.16	3.86
Power -75	4.86	4.18	5.12	4.30	4.70	3.77
Power -50	5.32	5.08	5.70	5.38	5.08	4.31
Power -30	6.22	7.05	6.69	7.58	5.80	5.79
Power -15	7.55	8.20	8.06	8.98	7.27	7.37
Power -10	8.51	9.41	9.12	10.67	8.30	8.46
Power -5	10.42	13.23	11.18	14.85	10.26	11.88
Power -2	12.44	17.55	11.91	19.44	11.32	17.09
Power 0	13.47	25.26	12.65	27.19	11.99	24.85
Power 0.5	13.06	26.93	12.86	28.28	12.79	26.00
Power 1	12.48	28.81	14.24	29.17	13.49	26.81
Portfolio E2	6.40	5.45	6.40	5.45	6.40	5.45
Portfolio E4	8.72	9.72	8.72	9.72	8.72	9.72
Portfolio E6	10.84	14.34	10.84	14.34	10.84	14.34
Portfolio E8	12.76	19.07	12.76	19.07	12.76	19.07
Portfolio E10	14.48	23.88	14.48	23.88	14.48	23.88
Portfolio V2	5.49	4.26	5.49	4.26	5.49	4.26
Portfolio V4	6.98	6.99	6.98	6.99	6.98	6.99
Portfolio V6	8.36	10.21	8.36	10.21	8.36	10.21
Portfolio V8	9.62	13.59	9.62	13.59	9.62	13.59
Portfolio V10	10.78	17.08	10.78	17.08	10.78	17.08

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 7d

Geometric Means and Standard Deviations of Annual Returns using 12 Equal-Weighted Industry Indices, without Leverage, 1966-86: 32, 28 and 40 Quarter Estimating Periods (simple probability assessment)

	32 Quarter		28 Quarter		40 Quarter	
Portfolio	G.Mean	S.Dev*	G.Mean	S.Dev*	G.Mean	S.Dev*
Petroleum	11.82	27.24	11.82	27.24	11.82	27.24
Finance & Real Estate	12.45	26.25	12.45	26.25	12.45	26.25
Consumer Durables	13.42	28.12	13.42	28.12	13.42	28.12
Basic Industries	12.69	17.41	12.69	17.41	12.69	17.41
Food & Tobacco	16.02	20.99	16.02	20.99	16.02	20.99
Construction	12.97	24.84	12.97	24.84	12.97	24.84
Capital Goods	11.88	25.02	11.88	25.02	11.88	25.02
Transportation	10.97	24.40	10.97	24.40	10.97	24.40
Utilities	12.13	17.33	12.13	17.33	12.13	17.33
Textiles & Trade	14.18	31.28	14.18	31.28	14.18	31.28
Services	14.22	32.55	14.22	32.55	14.22	32.55
Leisure	15.50	30.15	15.50	30.15	15.50	30.15
Risk-Free	7.49	2.71	7.49	2.71	7.49	2.71
Inflation	6.12	3.15	6.12	3.15	6.12	3.15
Power -75	7.93	2.88	7.86	2.99	7.81	2.75
Power -50	8.14	3.12	8.04	3.31	7.96	2.91
Power -30	8.55	3.76	8.39	4.16	8.26	3.43
Power -15	9.51	5.82	9.16	6.70	8.95	5.23
Power -10	10.37	7.98	9.83	9.32	9.55	7.19
Power -5	12.34	13.79	11.68	15.87	10.60	12.18
Power -2	14.46	19.05	12.38	21.19	11.35	18.35
Power 0	15.14	26.05	13.27	25.59	13.23	26.04
Power 0.5	14.88	26.19	13.32	26.27	14.57	25.64
Power 1	14.42	26.17	13.72	27.18	15.67	26.72
Portfolio E2	9.20	5.11	9.20	5.11	9.20	5.11
Portfolio E4	10.69	9.38	10.69	9.38	10.69	9.38
Portfolio E6	11.95	13.89	11.95	13.89	11.95	13.89
Portfolio E8	12.97	18.49	12.97	18.49	12.97	18.49
Portfolio E10	13.75	23.15	13.75	23.15	13.75	23.15
Portfolio V2	8.12	3.99	8.12	3.99	8.12	3.99
Portfolio V4	8.62	6.87	8.62	6.87	8.62	6.87
Portfolio V6	9.01	10.08	9.01	10.08	9.01	10.08
Portfolio V8	9.26	13.42	9.26	13.42	9.26	13.42
Portfolio V10	9.38	16.84	9.38	16.84	9.38	16.84

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 8a

Geometric Means and Standard Deviations of Annual Returns using 12 Value-Weighted Industry Indices, with Leverage, 1936-86: 32, 28 and 40 Quarter Estimating Periods (simple probability assessment)

Portfolio	32 Quarter G.Mean	32 Quarter S.Dev*	28 Quarter G.Mean	28 Quarter S.Dev*	40 Quarter G.Mean	40 Quarter S.Dev*
Petroleum	12.28	18.96	12.28	18.96	12.28	18.96
Finance & Real Estate	11.26	20.13	11.26	20.13	11.26	20.13
Consumer Durables	11.10	23.54	11.10	23.54	11.10	23.54
Basic Industries	10.49	17.56	10.49	17.56	10.49	17.56
Food & Tobacco	11.19	16.45	11.19	16.45	11.19	16.45
Construction	8.94	21.63	8.94	21.63	8.94	21.63
Capital Goods	10.80	20.57	10.80	20.57	10.80	20.57
Transportation	9.44	23.00	9.44	23.00	9.44	23.00
Utilities	9.80	14.31	9.80	14.31	9.80	14.31
Textiles & Trade	10.71	23.27	10.71	23.27	10.71	23.27
Services	14.15	28.27	14.15	28.27	14.15	28.27
Leisure	11.80	28.85	11.80	28.85	11.80	28.85
Risk-Free	3.90	3.47	3.90	3.47	3.90	3.47
Inflation	4.16	3.86	4.16	3.86	4.16	3.86
Power -75	5.05	4.66	5.26	4.70	4.82	4.22
Power -50	5.59	5.96	5.86	6.05	5.25	5.19
Power -30	6.34	7.95	6.71	8.01	5.93	7.03
Power -15	7.51	11.12	8.08	11.64	7.14	9.70
Power -10	8.08	13.11	8.70	14.01	7.95	11.31
Power -5	9.56	16.56	10.08	18.17	9.57	14.52
Power -2	11.89	22.13	12.09	23.64	11.74	19.88
Power 0	13.61	33.36	12.93	32.79	12.85	28.47
Power 0.5	13.75	44.09	12.82	43.90	13.06	35.79
Power 1	10.42	55.89	12.41	53.02	11.45	49.30
Portfolio V2	5.49	4.26	5.49	4.26	5.49	4.26
Portfolio V4	6.98	6.99	6.98	6.99	6.98	6.99
Portfolio V6	8.36	10.21	8.36	10.21	8.36	10.21
Portfolio V8	9.62	13.59	9.62	13.59	9.62	13.59
Portfolio V10	10.78	17.08	10.78	17.08	10.78	17.08
Portfolio V12	11.39	20.60	11.39	20.60	11.39	20.60
Portfolio V14	12.00	24.05	12.00	24.05	12.00	24.05
Portfolio V16	12.41	26.98	12.41	26.98	12.41	26.98
Portfolio V18	12.71	29.83	12.71	29.83	12.71	29.83
Portfolio V20	13.08	32.13	13.08	32.13	13.08	32.13

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 8b

Geometric Means and Standard Deviations of Annual Returns using 12 Value-Weighted Industry Indices, with Leverage, 1966-86: 32, 28 and 40 Quarter Estimating Periods (simple probability assessment)

Portfolio	32 Quarter G.Mean	32 Quarter S.Dev*	28 Quarter G.Mean	28 Quarter S.Dev*	40 Quarter G.Mean	40 Quarter S.Dev*
Petroleum	10.93	21.21	10.93	21.21	10.93	21.21
Finance & Real Estate	10.68	18.75	10.68	18.75	10.68	18.75
Consumer Durables	8.17	23.83	8.17	23.83	8.17	23.83
Basic Industries	8.58	15.15	8.58	15.15	8.58	15.15
Food & Tobacco	12.96	17.39	12.96	17.39	12.96	17.39
Construction	7.99	22.18	7.99	22.18	7.99	22.18
Capital Goods	7.92	20.54	7.92	20.54	7.92	20.54
Transportation	7.03	20.85	7.03	20.85	7.03	20.85
Utilities	9.68	13.69	9.68	13.69	9.68	13.69
Textiles & Trade	9.60	26.96	9.60	26.96	9.60	26.96
Services	10.67	28.10	10.67	28.10	10.67	28.10
Leisure	12.31	30.18	12.31	30.18	12.31	30.18
Risk-Free	7.49	2.71	7.49	2.71	7.49	2.71
Inflation	6.12	3.15	6.12	3.15	6.12	3.15
Power -75	7.81	2.90	7.69	2.95	7.69	2.70
Power -50	7.96	3.12	7.79	3.22	7.79	2.79
Power -30	8.25	3.73	7.97	3.91	7.97	3.09
Power -15	8.93	5.62	8.34	6.01	8.40	4.27
Power -10	9.52	7.59	8.63	8.17	8.78	5.63
Power -5	10.39	12.16	8.87	12.75	9.10	8.55
Power -2	11.31	19.52	9.23	19.65	9.06	14.34
Power 0	9.34	30.29	8.04	26.04	6.32	25.17
Power 0.5	8.87	35.97	7.55	32.73	3.20	32.98
Power 1	0.02	49.37	3.67	42.86	0.85	47.43
Portfolio V2	8.12	3.99	8.12	3.99	8.12	3.99
Portfolio V4	8.62	6.87	8.62	6.87	8.62	6.87
Portfolio V6	9.01	10.08	9.01	10.08	9.01	10.08
Portfolio V8	9.26	13.42	9.26	13.42	9.26	13.42
Portfolio V10	9.38	16.84	9.38	16.84	9.38	16.84
Portfolio V12	8.77	20.39	8.77	20.39	8.77	20.39
Portfolio V14	8.43	23.79	8.43	23.79	8.43	23.79
Portfolio V16	8.12	26.87	8.12	26.87	8.12	26.87
Portfolio V18	7.74	29.78	7.74	29.78	7.74	29.78
Portfolio V20	7.15	32.90	7.15	32.90	7.15	32.90

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 8c

Geometric Means and Standard Deviations of Annual Returns using 12 Value-Weighted Industry Indices, without Leverage, 1936-86: 32, 28 and 40 Quarter Estimating Periods (simple probability assessment)

Portfolio	32 Quarter G.Mean	32 Quarter S.Dev*	28 Quarter G.Mean	28 Quarter S.Dev*	40 Quarter G.Mean	40 Quarter S.Dev*
Petroleum	12.28	18.96	12.28	18.96	12.28	18.96
Finance & Real Estate	11.26	20.13	11.26	20.13	11.26	20.13
Consumer Durables	11.10	23.54	11.10	23.54	11.10	23.54
Basic Industries	10.49	17.56	10.49	17.56	10.49	17.56
Food & Tobacco	11.19	16.45	11.19	16.45	11.19	16.45
Construction	8.94	21.63	8.94	21.63	8.94	21.63
Capital Goods	10.80	20.57	10.80	20.57	10.80	20.57
Transportation	9.44	23.00	9.44	23.00	9.44	23.00
Utilities	9.80	14.31	9.80	14.31	9.80	14.31
Textiles & Trade	10.71	23.27	10.71	23.27	10.71	23.27
Services	14.15	28.27	14.15	28.27	14.15	28.27
Leisure	11.80	28.85	11.80	28.85	11.80	28.85
Risk-Free	3.90	3.47	3.90	3.47	3.90	3.47
Inflation	4.16	3.86	4.16	3.86	4.16	3.86
Power -75	5.05	4.66	5.26	4.70	4.82	4.22
Power -50	5.59	5.96	5.86	6.05	5.25	5.19
Power -30	6.34	7.95	6.67	7.99	5.93	7.03
Power -15	7.03	9.18	7.46	9.80	6.92	8.25
Power -10	7.68	10.47	8.11	11.43	7.75	9.20
Power -5	9.12	13.63	9.11	14.33	9.35	11.99
Power -2	10.01	17.23	9.44	17.76	9.62	14.79
Power 0	10.46	25.56	11.51	24.22	9.54	21.36
Power 0.5	9.93	28.61	11.97	27.26	9.52	25.26
Power 1	9.45	31.22	11.37	28.53	10.31	28.08
Portfolio V2	5.49	4.26	5.49	4.26	5.49	4.26
Portfolio V4	6.98	6.99	6.98	6.99	6.98	6.99
Portfolio V6	8.36	10.21	8.36	10.21	8.36	10.21
Portfolio V8	9.62	13.59	9.62	13.59	9.62	13.59
Portfolio V10	10.78	17.08	10.78	17.08	10.78	17.08

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 8d

Geometric Means and Standard Deviations of Annual Returns using 12 Value-Weighted Industry Indices, without Leverage, 1966-86: 32, 28 and 40 Quarter Estimating Periods (simple probability assessment)

Portfolio	32 Quarter G.Mean	32 Quarter S.Dev*	28 Quarter G.Mean	28 Quarter S.Dev*	40 Quarter G.Mean	40 Quarter S.Dev*
Petroleum	10.93	21.21	10.93	21.21	10.93	21.21
Finance & Real Estate	10.68	18.75	10.68	18.75	10.68	18.75
Consumer Durables	8.17	23.83	8.17	23.83	8.17	23.83
Basic Industries	8.58	15.15	8.58	15.15	8.58	15.15
Food & Tobacco	12.96	17.39	12.96	17.39	12.96	17.39
Construction	7.99	22.18	7.99	22.18	7.99	22.18
Capital Goods	7.92	20.54	7.92	20.54	7.92	20.54
Transportation	7.03	20.85	7.03	20.85	7.03	20.85
Utilities	9.68	13.69	9.68	13.69	9.68	13.69
Textiles & Trade	9.60	26.96	9.60	26.96	9.60	26.96
Services	10.67	28.10	10.67	28.10	10.67	28.10
Leisure	12.31	30.18	12.31	30.18	12.31	30.18
Risk-Free	7.49	2.71	7.49	2.71	7.49	2.71
Inflation	6.12	3.15	6.12	3.15	6.12	3.15
Power -75	7.81	2.90	7.69	2.95	7.69	2.70
Power -50	7.96	3.12	7.79	3.22	7.79	2.79
Power -30	8.25	3.73	7.97	3.91	7.97	3.09
Power -15	8.93	5.62	8.34	6.01	8.40	4.27
Power -10	9.52	7.59	8.63	8.17	8.78	5.63
Power -5	10.29	12.01	8.77	12.47	9.12	8.57
Power -2	10.61	16.92	8.33	16.13	8.36	13.51
Power 0	8.23	23.87	8.77	20.80	6.00	20.61
Power 0.5	6.64	28.39	8.36	23.97	5.42	26.01
Power 1	3.85	33.66	7.00	27.29	5.24	31.02
Portfolio V2	8.12	3.99	8.12	3.99	8.12	3.99
Portfolio V4	8.62	6.87	8.62	6.87	8.62	6.87
Portfolio V6	9.01	10.08	9.01	10.08	9.01	10.08
Portfolio V8	9.26	13.42	9.26	13.42	9.26	13.42
Portfolio V10	9.38	16.84	9.38	16.84	9.38	16.84

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 9a

Geometric Means and Standard Deviations of Annual Returns using 12 Equal-Weighted Industry Indices, with Leverage, 1934-86: Inflation Adapter vs. Sum-of-the-Digits vs. All-of-History (32 quarter estimating period)

Portfolio	Inflation Adapter G.Mean	Inflation Adapter S.Dev*	Sum-of-Digits G.Mean	Sum-of-Digits S.Dev*	All-of-History G.Mean	All-of-History S.Dev*
Petroleum	14.98	24.21	14.98	24.21	14.98	24.21
Finance & Real Estate	14.76	25.22	14.76	25.22	14.76	25.22
Consumer Durables	15.12	28.04	15.12	28.04	15.12	28.04
Basic Industries	14.60	21.38	14.60	21.38	14.60	21.38
Food & Tobacco	14.58	19.78	14.58	19.78	14.58	19.78
Construction	13.70	26.80	13.70	26.80	13.70	26.80
Capital Goods	14.58	25.54	14.58	25.54	14.58	25.54
Transportation	14.22	29.43	14.22	29.43	14.22	29.43
Utilities	13.22	23.05	13.22	23.05	13.22	23.05
Textiles & Trade	14.81	28.26	14.81	28.26	14.81	28.26
Services	16.40	32.39	16.40	32.39	16.40	32.39
Leisure	15.64	30.40	15.64	30.40	15.64	30.40
Risk-Free	3.76	3.47	3.76	3.47	3.76	3.47
Inflation	4.09	3.80	4.09	3.80	4.09	3.80
Power -75	4.71	4.08	4.91	4.25	3.96	3.42
Power -50	5.17	4.89	5.46	5.22	4.06	3.41
Power -30	5.99	6.80	6.49	7.40	4.25	3.42
Power -15	7.44	9.35	8.10	10.37	4.70	3.58
Power -10	8.73	11.30	9.55	12.52	5.12	3.88
Power -5	11.00	14.12	11.83	17.01	6.25	5.22
Power -2	14.24	19.67	15.12	24.99	8.66	9.30
Power 0	17.51	30.13	15.74	39.00	14.33	23.89
Power 0.5	17.90	42.09	15.41	48.69	17.39	36.72
Power 1	14.63	53.87	16.84	50.90	15.37	45.69
Portfolio E2	6.47	5.40	6.47	5.40	6.47	5.40
Portfolio E4	8.99	9.72	8.99	9.72	8.99	9.72
Portfolio E6	11.31	14.39	11.31	14.39	11.31	14.39
Portfolio E8	13.42	19.14	13.42	19.14	13.42	19.14
Portfolio E10	15.31	23.96	15.31	23.96	15.31	23.96
Portfolio E12	16.56	28.80	16.56	28.80	16.56	28.80
Portfolio E14	17.77	33.41	17.77	33.41	17.77	33.41
Portfolio E16	18.61	37.35	18.61	37.35	18.61	37.35
Portfolio E18	19.29	41.08	19.29	41.08	19.29	41.08
Portfolio E20	20.18	43.74	20.18	43.74	20.18	43.74
Portfolio V2	5.47	4.24	5.47	4.24	5.47	4.24
Portfolio V4	7.07	6.99	7.07	6.99	7.07	6.99
Portfolio V6	8.56	10.24	8.56	10.24	8.56	10.24
Portfolio V8	9.94	13.66	9.94	13.66	9.94	13.66
Portfolio V10	11.21	17.16	11.21	17.16	11.21	17.16
Portfolio V12	11.93	20.69	11.93	20.69	11.93	20.69
Portfolio V14	12.65	24.15	12.65	24.15	12.65	24.15
Portfolio V16	13.18	27.11	13.18	27.11	13.18	27.11
Portfolio V18	13.57	30.00	13.57	30.00	13.57	30.00
Portfolio V20	14.04	32.34	14.04	32.34	14.04	32.34

*Standard Deviation is for the variable ln(1+r).

Table 9b

Geometric Means and Standard Deviations of Annual Returns using 12 Equal-Weighted Industry Indices, with Leverage, 1966-86: Inflation Adapter vs. Sum-of-the-Digits vs. All-of-History (32 quarter estimating period)

Portfolio	Inflation Adapter G.Mean	S.Dev*	Sum-of-Digits G.Mean	S.Dev*	All-of-History G.Mean	S.Dev*
Petroleum	11.82	27.24	11.82	27.24	11.82	27.24
Finance & Real Estate	12.45	26.25	12.45	26.25	12.45	26.25
Consumer Durables	13.42	28.12	13.42	28.12	13.42	28.12
Basic Industries	12.69	17.41	12.69	17.41	12.69	17.41
Food & Tobacco	16.02	20.99	16.02	20.99	16.02	20.99
Construction	12.97	24.84	12.97	24.84	12.97	24.84
Capital Goods	11.88	25.02	11.88	25.02	11.88	25.02
Transportation	10.97	24.40	10.97	24.40	10.97	24.40
Utilities	12.13	17.33	12.13	17.33	12.13	17.33
Textiles & Trade	14.18	31.28	14.18	31.28	14.18	31.28
Services	14.22	32.55	14.22	32.55	14.22	32.55
Leisure	15.50	30.15	15.50	30.15	15.50	30.15
Risk-Free	7.49	2.71	7.49	2.71	7.49	2.71
Inflation	6.12	3.15	6.12	3.15	6.12	3.15
Power -75	7.91	2.73	8.01	3.01	7.64	2.65
Power -50	8.12	2.85	8.27	3.37	7.71	2.64
Power -30	8.52	3.24	8.76	4.33	7.86	2.65
Power -15	9.45	4.65	9.87	7.16	8.20	2.89
Power -10	10.30	6.23	10.85	10.01	8.51	3.31
Power -5	12.17	10.31	12.59	16.83	9.33	4.95
Power -2	14.80	17.59	14.84	26.60	10.99	9.42
Power 0	15.84	25.37	13.55	36.99	13.01	23.98
Power 0.5	15.82	30.77	14.20	39.42	12.57	30.16
Power 1	12.17	38.72	12.59	39.69	12.57	42.73
Portfolio E2	9.20	5.11	9.20	5.11	9.20	5.11
Portfolio E4	10.69	9.38	10.69	9.38	10.69	9.38
Portfolio E6	11.95	13.89	11.95	13.89	11.95	13.89
Portfolio E8	12.97	18.49	12.97	18.49	12.97	18.49
Portfolio E10	13.75	23.15	13.75	23.15	13.75	23.15
Portfolio E12	13.67	27.95	13.67	27.95	13.67	27.95
Portfolio E14	13.95	32.15	13.95	32.15	13.95	32.15
Portfolio E16	14.10	35.44	14.10	35.44	14.10	35.44
Portfolio E18	14.26	37.98	14.26	37.98	14.26	37.98
Portfolio E20	14.27	40.71	14.27	40.71	14.27	40.71
Portfolio V2	8.12	3.99	8.12	3.99	8.12	3.99
Portfolio V4	8.62	6.87	8.62	6.87	8.62	6.87
Portfolio V6	9.01	10.08	9.01	10.08	9.01	10.08
Portfolio V8	9.26	13.42	9.26	13.42	9.26	13.42
Portfolio V10	9.38	16.84	9.38	16.84	9.38	16.84
Portfolio V12	8.77	20.39	8.77	20.39	8.77	20.39
Portfolio V14	8.43	23.79	8.43	23.79	8.43	23.79
Portfolio V16	8.12	26.87	8.12	26.87	8.12	26.87
Portfolio V18	7.74	29.78	7.74	29.78	7.74	29.78
Portfolio V20	7.15	32.90	7.15	32.90	7.15	32.90

*Standard Deviation is for the variable ln(1+r).

Table 9c

Geometric Means and Standard Deviations of Annual Returns using 12 Equal-Weighted Industry Indices, without Leverage, 1934-86: Inflation Adapter vs. Sum-of-the-Digits vs. All-of-History (32 quarter estimating period)

Portfolio	Inflation Adapter* G.Mean	Inflation Adapter* S.Dev	Sum-of-Digits* G.Mean	Sum-of-Digits* S.Dev	All-of-History* G.Mean	All-of-History* S.Dev
Petroleum	14.98	24.21	14.98	24.21	14.98	24.21
Finance & Real Estate	14.76	25.22	14.76	25.22	14.76	25.22
Consumer Durables	15.12	28.04	15.12	28.04	15.12	28.04
Basic Industries	14.60	21.38	14.60	21.38	14.60	21.38
Food & Tobacco	14.58	19.78	14.58	19.78	14.58	19.78
Construction	13.70	26.80	13.70	26.80	13.70	26.80
Capital Goods	14.58	25.54	14.58	25.54	14.58	25.54
Transportation	14.22	29.43	14.22	29.43	14.22	29.43
Utilities	13.22	23.05	13.22	23.05	13.22	23.05
Textiles & Trade	14.81	28.26	14.81	28.26	14.81	28.26
Services	16.40	32.39	16.40	32.39	16.40	32.39
Leisure	15.64	30.40	15.64	30.40	15.64	30.40
Risk-Free	3.76	3.47	3.76	3.47	3.76	3.47
Inflation	4.09	3.80	4.09	3.80	4.09	3.80
Power -75	4.71	4.08	4.91	4.25	3.96	3.42
Power -50	5.17	4.89	5.46	5.22	4.06	3.41
Power -30	5.99	6.80	6.49	7.40	4.25	3.42
Power -15	7.34	7.94	7.96	8.82	4.70	3.58
Power -10	8.34	8.91	8.96	10.50	5.12	3.88
Power -5	10.34	11.72	11.15	15.06	6.25	5.22
Power -2	12.11	15.07	12.01	20.15	8.66	9.30
Power 0	13.42	22.16	12.86	25.67	13.28	21.90
Power 0.5	13.04	24.65	13.98	27.36	13.49	22.99
Power 1	12.58	27.02	13.73	26.76	11.96	25.66
Portfolio E2	6.47	5.40	6.47	5.40	6.47	5.40
Portfolio E4	8.99	9.72	8.99	9.72	8.99	9.72
Portfolio E6	11.31	14.39	11.31	14.39	11.31	14.39
Portfolio E8	13.42	19.14	13.42	19.14	13.42	19.14
Portfolio E10	15.31	23.96	15.31	23.96	15.31	23.96
Portfolio V2	5.47	4.24	5.47	4.24	5.47	4.24
Portfolio V4	7.07	6.99	7.07	6.99	7.07	6.99
Portfolio V6	8.56	10.24	8.56	10.24	8.56	10.24
Portfolio V8	9.94	13.66	9.94	13.66	9.94	13.66
Portfolio V10	11.21	17.16	11.21	17.16	11.21	17.16

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 9d

Geometric Means and Standard Deviations of Annual Returns using 12 Equal-Weighted Industry Indices, without Leverage, 1966-86: Inflation Adapter vs. Sum-of-the-Digits vs. All-of-History (32 quarter estimating period)

Portfolio	Inflation Adapter G.Mean	Inflation Adapter S.Dev*	Sum-of-Digits G.Mean	Sum-of-Digits S.Dev*	All-of-History G.Mean	All-of-History S.Dev*
Petroleum	11.82	27.24	11.82	27.24	11.82	27.24
Finance & Real Estate	12.45	26.25	12.45	26.25	12.45	26.25
Consumer Durables	13.42	28.12	13.42	28.12	13.42	28.12
Basic Industries	12.69	17.41	12.69	17.41	12.69	17.41
Food & Tobacco	16.02	20.99	16.02	20.99	16.02	20.99
Construction	12.97	24.84	12.97	24.84	12.97	24.84
Capital Goods	11.88	25.02	11.88	25.02	11.88	25.02
Transportation	10.97	24.40	10.97	24.40	10.97	24.40
Utilities	12.13	17.33	12.13	17.33	12.13	17.33
Textiles & Trade	14.18	31.28	14.18	31.28	14.18	31.28
Services	14.22	32.55	14.22	32.55	14.22	32.55
Leisure	15.50	30.15	15.50	30.15	15.50	30.15
Risk-Free	7.49	2.71	7.49	2.71	7.49	2.71
Inflation	6.12	3.15	6.12	3.15	6.12	3.15
Power -75	7.91	2.73	8.01	3.01	7.64	2.65
Power -50	8.12	2.85	8.27	3.37	7.71	2.64
Power -30	8.52	3.24	8.76	4.33	7.86	2.65
Power -15	9.45	4.65	9.87	7.16	8.20	2.89
Power -10	10.30	6.23	10.85	10.01	8.51	3.31
Power -5	12.09	10.09	12.67	16.63	9.33	4.95
Power -2	13.01	13.54	12.35	21.84	10.99	9.42
Power 0	13.61	19.15	12.50	24.24	12.49	22.39
Power 0.5	13.35	19.69	12.86	24.39	10.94	22.71
Power 1	13.92	20.52	13.03	22.47	12.16	25.97
Portfolio E2	9.20	5.11	9.20	5.11	9.20	5.11
Portfolio E4	10.69	9.38	10.69	9.38	10.69	9.38
Portfolio E6	11.95	13.89	11.95	13.89	11.95	13.89
Portfolio E8	12.97	18.49	12.97	18.49	12.97	18.49
Portfolio E10	13.75	23.15	13.75	23.15	13.75	23.15
Portfolio V2	8.12	3.99	8.12	3.99	8.12	3.99
Portfolio V4	8.62	6.87	8.62	6.87	8.62	6.87
Portfolio V6	9.01	10.08	9.01	10.08	9.01	10.08
Portfolio V8	9.26	13.42	9.26	13.42	9.26	13.42
Portfolio V10	9.38	16.84	9.38	16.84	9.38	16.84

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 10a

Geometric Means and Standard Deviations of Annual Returns using 12 Value-Weighted Industry Indices, with Leverage, 1934-86: Inflation Adapter vs. Sum-of-the-Digits vs. All-of-History (32 quarter estimating period)

Portfolio	Inflation Adapter G.Mean	Inflation Adapter S.Dev*	Sum-of-Digits G.Mean	Sum-of-Digits S.Dev*	All-of-History G.Mean	All-of-History S.Dev*
Petroleum	12.20	18.96	12.20	18.96	12.20	18.96
Finance & Real Estate	12.08	20.29	12.08	20.29	12.08	20.29
Consumer Durables	11.82	23.87	11.82	23.87	11.82	23.87
Basic Industries	10.95	17.67	10.95	17.67	10.95	17.67
Food & Tobacco	11.44	16.17	11.44	16.17	11.44	16.17
Construction	9.61	21.91	9.61	21.91	9.61	21.91
Capital Goods	11.73	20.74	11.73	20.74	11.73	20.74
Transportation	9.31	22.73	9.31	22.73	9.31	22.73
Utilities	10.33	15.50	10.33	15.50	10.33	15.50
Textiles & Trade	11.28	22.98	11.28	22.98	11.28	22.98
Services	12.75	31.39	12.75	31.39	12.75	31.39
Leisure	12.64	28.62	12.64	28.62	12.64	28.62
Risk-Free	3.76	3.47	3.76	3.47	3.76	3.47
Inflation	4.09	3.80	4.09	3.80	4.09	3.80
Power -75	4.84	4.57	5.04	4.69	3.91	3.43
Power -50	5.36	5.77	5.65	6.01	3.98	3.42
Power -30	6.07	7.67	6.58	8.15	4.12	3.43
Power -15	7.27	10.84	7.91	11.52	4.46	3.56
Power -10	7.81	12.82	8.73	13.99	4.77	3.82
Power -5	9.43	15.96	10.27	17.96	5.58	4.96
Power -2	12.18	20.95	11.94	24.87	7.28	8.47
Power 0	14.46	30.76	12.19	36.49	10.16	19.95
Power 0.5	14.26	41.04	11.58	48.73	13.13	29.84
Power 1	15.82	50.21	11.51	57.65	14.96	44.85
Portfolio V2	5.47	4.24	5.47	4.24	5.47	4.24
Portfolio V4	7.07	6.99	7.07	6.99	7.07	6.99
Portfolio V6	8.56	10.24	8.56	10.24	8.56	10.24
Portfolio V8	9.94	13.66	9.94	13.66	9.94	13.66
Portfolio V10	11.21	17.16	11.21	17.16	11.21	17.16
Portfolio V12	11.93	20.69	11.93	20.69	11.93	20.69
Portfolio V14	12.65	24.15	12.65	24.15	12.65	24.15
Portfolio V16	13.18	27.11	13.18	27.11	13.18	27.11
Portfolio V18	13.57	30.00	13.57	30.00	13.57	30.00
Portfolio V20	14.04	32.34	14.04	32.34	14.04	32.34

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 10b

Geometric Means and Standard Deviations of Annual Returns using 12 Value-Weighted Industry Indices, with Leverage, 1966-86: Inflation Adapter vs. Sum-of-the-Digits vs. All-of-History (32 quarter estimating period)

Portfolio	Inflation Adapter* G.Mean	S.Dev	Sum-of-Digits* G.Mean	S.Dev	All-of-History* G.Mean	S.Dev
Petroleum	10.93	21.21	10.93	21.21	10.93	21.21
Finance & Real Estate	10.68	18.75	10.68	18.75	10.68	18.75
Consumer Durables	8.17	23.83	8.17	23.83	8.17	23.83
Basic Industries	8.58	15.15	8.58	15.15	8.58	15.15
Food & Tobacco	12.96	17.39	12.96	17.39	12.96	17.39
Construction	7.99	22.18	7.99	22.18	7.99	22.18
Capital Goods	7.92	20.54	7.92	20.54	7.92	20.54
Transportation	7.03	20.85	7.03	20.85	7.03	20.85
Utilities	9.68	13.69	9.68	13.69	9.68	13.69
Textiles & Trade	9.60	26.96	9.60	26.96	9.60	26.96
Services	10.67	28.10	10.67	28.10	10.67	28.10
Leisure	12.31	30.18	12.31	30.18	12.31	30.18
Risk-Free	7.49	2.71	7.49	2.71	7.49	2.71
Inflation	6.12	3.15	6.12	3.15	6.12	3.15
Power -75	7.86	2.80	7.85	3.00	7.57	2.67
Power -50	8.03	2.98	8.02	3.34	7.61	2.66
Power -30	8.36	3.49	8.35	4.21	7.68	2.67
Power -15	9.11	5.14	9.07	6.73	7.87	2.80
Power -10	9.72	6.79	9.69	9.31	8.03	3.05
Power -5	10.93	10.65	10.25	14.71	8.46	4.11
Power -2	12.62	17.12	10.46	23.80	9.29	7.26
Power 0	12.35	25.39	9.07	33.92	9.75	18.82
Power 0.5	11.26	27.84	9.09	36.96	7.82	24.66
Power 1	9.60	32.07	7.81	39.29	7.28	43.60
Portfolio V2	8.12	3.99	8.12	3.99	8.12	3.99
Portfolio V4	8.62	6.87	8.62	6.87	8.62	6.87
Portfolio V6	9.01	10.08	9.01	10.08	9.01	10.08
Portfolio V8	9.26	13.42	9.26	13.42	9.26	13.42
Portfolio V10	9.38	16.84	9.38	16.84	9.38	16.84
Portfolio V12	8.77	20.39	8.77	20.39	8.77	20.39
Portfolio V14	8.43	23.79	8.43	23.79	8.43	23.79
Portfolio V16	8.12	26.87	8.12	26.87	8.12	26.87
Portfolio V18	7.74	29.78	7.74	29.78	7.74	29.78
Portfolio V20	7.15	32.90	7.15	32.90	7.15	32.90

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 10c

Geometric Means and Standard Deviations of Annual Returns using 12 Value-Weighted Industry Indices, without Leverage, 1934-86: Inflation Adapter vs. Sum-of-the-Digits vs. All-of-History (32 quarter estimating period)

Portfolio	Inflation Adapter G.Mean	S.Dev*	Sum-of-Digits G.Mean	S.Dev*	All-of-History G.Mean	S.Dev*
Petroleum	12.20	18.96	12.20	18.96	12.20	18.96
Finance & Real Estate	12.08	20.29	12.08	20.29	12.08	20.29
Consumer Durables	11.82	23.87	11.82	23.87	11.82	23.87
Basic Industries	10.95	17.67	10.95	17.67	10.95	17.67
Food & Tobacco	11.44	16.17	11.44	16.17	11.44	16.17
Construction	9.61	21.91	9.61	21.91	9.61	21.91
Capital Goods	11.73	20.74	11.73	20.74	11.73	20.74
Transportation	9.31	22.73	9.31	22.73	9.31	22.73
Utilities	10.33	15.50	10.33	15.50	10.33	15.50
Textiles & Trade	11.28	22.98	11.28	22.98	11.28	22.98
Services	12.75	31.39	12.75	31.39	12.75	31.39
Leisure	12.64	28.62	12.64	28.62	12.64	28.62
Risk-Free	3.76	3.47	3.76	3.47	3.76	3.47
Inflation	4.09	3.80	4.09	3.80	4.09	3.80
Power -75	4.84	4.57	5.04	4.69	3.91	3.43
Power -50	5.36	5.77	5.65	6.01	3.98	3.42
Power -30	6.07	7.67	6.58	8.15	4.12	3.43
Power -15	6.81	9.02	7.40	9.80	4.46	3.56
Power -10	7.51	10.27	8.20	11.38	4.77	3.82
Power -5	9.06	12.86	9.34	14.78	5.58	4.96
Power -2	9.95	15.76	9.56	19.13	7.28	8.47
Power 0	11.13	23.25	10.56	25.53	9.94	19.04
Power 0.5	11.26	25.21	11.96	26.87	11.38	22.31
Power 1	12.86	25.57	11.90	27.94	12.08	23.72
Portfolio V2	5.47	4.24	5.47	4.24	5.47	4.24
Portfolio V4	7.07	6.99	7.07	6.99	7.07	6.99
Portfolio V6	8.56	10.24	8.56	10.24	8.56	10.24
Portfolio V8	9.94	13.66	9.94	13.66	9.94	13.66
Portfolio V10	11.21	17.16	11.21	17.16	11.21	17.16

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 10d

Geometric Means and Standard Deviations of Annual Returns using 12 Value-Weighted Industry Indices, without Leverage, 1966-86: Inflation Adapter vs. Sum-of-the-Digits vs. All-of-History (32 quarter estimating period)

Portfolio	Inflation Adapter G.Mean	Inflation Adapter S.Dev*	Sum-of-Digits G.Mean	Sum-of-Digits S.Dev*	All-of-History G.Mean	All-of-History S.Dev*
Petroleum	10.93	21.21	10.93	21.21	10.93	21.21
Finance & Real Estate	10.68	18.75	10.68	18.75	10.68	18.75
Consumer Durables	8.17	23.83	8.17	23.83	8.17	23.83
Basic Industries	8.58	15.15	8.58	15.15	8.58	15.15
Food & Tobacco	12.96	17.39	12.96	17.39	12.96	17.39
Construction	7.99	22.18	7.99	22.18	7.99	22.18
Capital Goods	7.92	20.54	7.92	20.54	7.92	20.54
Transportation	7.03	20.85	7.03	20.85	7.03	20.85
Utilities	9.68	13.69	9.68	13.69	9.68	13.69
Textiles & Trade	9.60	26.96	9.60	26.96	9.60	26.96
Services	10.67	28.10	10.67	28.10	10.67	28.10
Leisure	12.31	30.18	12.31	30.18	12.31	30.18
Risk-Free	7.49	2.71	7.49	2.71	7.49	2.71
Inflation	6.12	3.15	6.12	3.15	6.12	3.15
Power -75	7.86	2.80	7.85	3.00	7.57	2.67
Power -50	8.03	2.98	8.02	3.34	7.61	2.66
Power -30	8.36	3.49	8.35	4.21	7.68	2.67
Power -15	9.11	5.14	9.07	6.73	7.87	2.80
Power -10	9.85	7.06	9.71	9.35	8.03	3.05
Power -5	10.81	10.32	9.99	14.09	8.46	4.11
Power -2	11.10	13.79	9.38	19.89	9.29	7.26
Power 0	10.41	18.67	9.85	22.92	9.64	18.35
Power 0.5	9.43	19.41	10.38	23.09	7.97	20.55
Power 1	10.25	19.16	10.18	22.36	8.80	23.52
Portfolio V2	8.12	3.99	8.12	3.99	8.12	3.99
Portfolio V4	8.62	6.87	8.62	6.87	8.62	6.87
Portfolio V6	9.01	10.08	9.01	10.08	9.01	10.08
Portfolio V8	9.26	13.42	9.26	13.42	9.26	13.42
Portfolio V10	9.38	16.84	9.38	16.84	9.38	16.84

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 11a

Geometric Means and Standard Deviations of Annual Returns using 12 Equal-Weighted Industry Indices, with Leverage, 1934-86: Disaster States Scenario for J = 1, 6, and 12 (32 quarter estimating period, simple probability assessment)

Portfolio	D. State 1 G.Mean	D. State 1 S.Dev*	D. State 6 G.Mean	D. State 6 S.Dev*	D. State 12 G.Mean	D. State 12 S.Dev*
Petroleum	14.98	24.21	14.98	24.21	14.98	24.21
Finance & Real Estate	14.76	25.22	14.76	25.22	14.76	25.22
Consumer Durables	15.12	28.04	15.12	28.04	15.12	28.04
Basic Industries	14.60	21.38	14.60	21.38	14.60	21.38
Food & Tobacco	14.58	19.78	14.58	19.78	14.58	19.78
Construction	13.70	26.80	13.70	26.80	13.70	26.80
Capital Goods	14.58	25.54	14.58	25.54	14.58	25.54
Transportation	14.22	29.43	14.22	29.43	14.22	29.43
Utilities	13.22	23.05	13.22	23.05	13.22	23.05
Textiles & Trade	14.81	28.26	14.81	28.26	14.81	28.26
Services	16.40	32.39	16.40	32.39	16.40	32.39
Leisure	15.64	30.40	15.64	30.40	15.64	30.40
Risk-Free	3.76	3.47	3.76	3.47	3.76	3.47
Inflation	4.09	3.80	4.09	3.80	4.09	3.80
Power -75	4.57	4.12	4.24	3.99	4.13	3.90
Power -50	4.96	4.93	4.47	4.63	4.30	4.45
Power -30	5.70	6.83	4.90	6.28	4.63	5.92
Power -15	6.82	9.27	5.41	8.12	4.99	7.53
Power -10	7.96	10.91	5.83	9.80	5.17	9.28
Power -5	9.72	13.37	6.45	11.09	5.50	10.61
Power -2	12.33	18.93	7.19	12.18	5.70	10.96
Power 0	17.02	29.46	9.17	15.72	5.92	11.63
Power 0.5	18.64	39.62	9.97	20.32	6.11	12.47
Power 1	16.59	55.48	14.35	48.67	3.58	22.95
Portfolio E2	6.47	5.40	6.47	5.40	6.47	5.40
Portfolio E4	8.99	9.72	8.99	9.72	8.99	9.72
Portfolio E6	11.31	14.39	11.31	14.39	11.31	14.39
Portfolio E8	13.42	19.14	13.42	19.14	13.42	19.14
Portfolio E10	15.31	23.96	15.31	23.96	15.31	23.96
Portfolio E12	16.56	28.80	16.56	28.80	16.56	28.80
Portfolio E14	17.77	33.41	17.77	33.41	17.77	33.41
Portfolio E16	18.61	37.35	18.61	37.35	18.61	37.35
Portfolio E18	19.29	41.08	19.29	41.08	19.29	41.08
Portfolio E20	20.18	43.74	20.18	43.74	20.18	43.74
Portfolio V2	5.47	4.24	5.47	4.24	5.47	4.24
Portfolio V4	7.07	6.99	7.07	6.99	7.07	6.99
Portfolio V6	8.56	10.24	8.56	10.24	8.56	10.24
Portfolio V8	9.94	13.66	9.94	13.66	9.94	13.66
Portfolio V10	11.21	17.16	11.21	17.16	11.21	17.16
Portfolio V12	11.93	20.69	11.93	20.69	11.93	20.69
Portfolio V14	12.65	24.15	12.65	24.15	12.65	24.15
Portfolio V16	13.18	27.11	13.18	27.11	13.18	27.11
Portfolio V18	13.57	30.00	13.57	30.00	13.57	30.00
Portfolio V20	14.04	32.34	14.04	32.34	14.04	32.34

*Standard Deviation is for the variable ln(1+r).

Table 11b

Geometric Means and Standard Deviations of Annual Returns using 12 Equal-Weighted Industry Indices, with Leverage, 1966-86: Disaster States Scenario for J = 1, 6, and 12 (32 quarter estimating period, simple probability assessment)

Portfolio	D. State 1 G.Mean	D. State 1 S.Dev*	D. State 6 G.Mean	D. State 6 S.Dev*	D. State 12 G.Mean	D. State 12 S.Dev*
Petroleum	11.82	27.24	11.82	27.24	11.82	27.24
Finance & Real Estate	12.45	26.25	12.45	26.25	12.45	26.25
Consumer Durables	13.42	28.12	13.42	28.12	13.42	28.12
Basic Industries	12.69	17.41	12.69	17.41	12.69	17.41
Food & Tobacco	16.02	20.99	16.02	20.99	16.02	20.99
Construction	12.97	24.84	12.97	24.84	12.97	24.84
Capital Goods	11.88	25.02	11.88	25.02	11.88	25.02
Transportation	10.97	24.40	10.97	24.40	10.97	24.40
Utilities	12.13	17.33	12.13	17.33	12.13	17.33
Textiles & Trade	14.18	31.28	14.18	31.28	14.18	31.28
Services	14.22	32.55	14.22	32.55	14.22	32.55
Leisure	15.50	30.15	15.50	30.15	15.50	30.15
Risk-Free	7.49	2.71	7.49	2.71	7.49	2.71
Inflation	6.12	3.15	6.12	3.15	6.12	3.15
Power -75	7.86	2.80	7.61	2.75	7.51	2.71
Power -50	8.04	2.94	7.67	2.78	7.52	2.72
Power -30	8.39	3.34	7.79	2.84	7.54	2.73
Power -15	9.20	4.74	8.07	3.07	7.59	2.75
Power -10	9.95	6.29	8.34	3.35	7.63	2.79
Power -5	11.82	10.68	9.04	4.29	7.75	2.89
Power -2	14.53	18.56	10.36	6.53	8.01	3.25
Power 0	18.73	30.36	13.46	12.75	8.87	5.11
Power 0.5	18.94	36.29	14.79	18.77	9.54	7.18
Power 1	12.71	44.70	15.48	23.36	11.56	10.53
Portfolio E2	9.20	5.11	9.20	5.11	9.20	5.11
Portfolio E4	10.69	9.38	10.69	9.38	10.69	9.38
Portfolio E6	11.95	13.89	11.95	13.89	11.95	13.89
Portfolio E8	12.97	18.49	12.97	18.49	12.97	18.49
Portfolio E10	13.75	23.15	13.75	23.15	13.75	23.15
Portfolio E12	13.67	27.95	13.67	27.95	13.67	27.95
Portfolio E14	13.95	32.15	13.95	32.15	13.95	32.15
Portfolio E16	14.10	35.44	14.10	35.44	14.10	35.44
Portfolio E18	14.26	37.98	14.26	37.98	14.26	37.98
Portfolio E20	14.27	40.71	14.27	40.71	14.27	40.71
Portfolio V2	8.12	3.99	8.12	3.99	8.12	3.99
Portfolio V4	8.62	6.87	8.62	6.87	8.62	6.87
Portfolio V6	9.01	10.08	9.01	10.08	9.01	10.08
Portfolio V8	9.26	13.42	9.26	13.42	9.26	13.42
Portfolio V10	9.38	16.84	9.38	16.84	9.38	16.84
Portfolio V12	8.77	20.39	8.77	20.39	8.77	20.39
Portfolio V14	8.43	23.79	8.43	23.79	8.43	23.79
Portfolio V16	8.12	26.87	8.12	26.87	8.12	26.87
Portfolio V18	7.74	29.78	7.74	29.78	7.74	29.78
Portfolio V20	7.15	32.90	7.15	32.90	7.15	32.90

*Standard Deviation is for the variable ln(1+r).

Table 11c

Geometric Means and Standard Deviations of Annual Returns using 12 Equal-Weighted Industry Indices, without Leverage, 1934-86; Disaster States Scenario for J = 1, 6, and 12 (32 quarter estimating period, simple probability assessment)

Portfolio	D. State 1 G.Mean	D. State 1 S.Dev*	D. State 6 G.Mean	D. State 6 S.Dev*	D. State 12 G.Mean	D. State 12 S.Dev*
Petroleum	14.98	24.21	14.98	24.21	14.98	24.21
Finance & Real Estate	14.76	25.22	14.76	25.22	14.76	25.22
Consumer Durables	15.12	28.04	15.12	28.04	15.12	28.04
Basic Industries	14.60	21.38	14.60	21.38	14.60	21.38
Food & Tobacco	14.58	19.78	14.58	19.78	14.58	19.78
Construction	13.70	26.80	13.70	26.80	13.70	26.80
Capital Goods	14.58	25.54	14.58	25.54	14.58	25.54
Transportation	14.22	29.43	14.22	29.43	14.22	29.43
Utilities	13.22	23.05	13.22	23.05	13.22	23.05
Textiles & Trade	14.81	28.26	14.81	28.26	14.81	28.26
Services	16.40	32.39	16.40	32.39	16.40	32.39
Leisure	15.64	30.40	15.64	30.40	15.64	30.40
Risk-Free	3.76	3.47	3.76	3.47	3.76	3.47
Inflation	4.09	3.80	4.09	3.80	4.09	3.80
Power -75	4.57	4.12	4.24	3.99	4.13	3.90
Power -50	4.96	4.93	4.47	4.63	4.30	4.45
Power -30	5.70	6.83	4.90	6.28	4.63	5.92
Power -15	6.80	7.78	5.41	7.46	5.00	7.39
Power -10	7.57	8.58	5.57	7.63	5.02	7.46
Power -5	9.12	11.14	6.09	8.22	5.12	7.56
Power -2	11.49	15.62	6.69	9.33	5.35	7.94
Power 0	13.51	23.00	8.26	12.68	5.52	8.46
Power 0.5	14.32	26.39	8.59	15.96	5.50	9.60
Power 1	13.83	28.84	11.70	24.85	5.03	12.52
Portfolio E2	6.47	5.40	6.47	5.40	6.47	5.40
Portfolio E4	8.99	9.72	8.99	9.72	8.99	9.72
Portfolio E6	11.31	14.39	11.31	14.39	11.31	14.39
Portfolio E8	13.42	19.14	13.42	19.14	13.42	19.14
Portfolio E10	15.31	23.96	15.31	23.96	15.31	23.96
Portfolio V2	5.47	4.24	5.47	4.24	5.47	4.24
Portfolio V4	7.07	6.99	7.07	6.99	7.07	6.99
Portfolio V6	8.56	10.24	8.56	10.24	8.56	10.24
Portfolio V8	9.94	13.66	9.94	13.66	9.94	13.66
Portfolio V10	11.21	17.16	11.21	17.16	11.21	17.16

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 11d

Geometric Means and Standard Deviations of Annual Returns using 12 Equal-Weighted Industry Indices, without Leverage, 1966-86: Disaster States Scenario for J = 1, 6, and 12 (32 quarter estimating period, simple probability assessment)

Portfolio	D. State 1 G.Mean	D. State 1 S.Dev*	D. State 6 G.Mean	D. State 6 S.Dev*	D. State 12 G.Mean	D. State 12 S.Dev*
Petroleum	11.82	27.24	11.82	27.24	11.82	27.24
Finance & Real Estate	12.45	26.25	12.45	26.25	12.45	26.25
Consumer Durables	13.42	28.12	13.42	28.12	13.42	28.12
Basic Industries	12.69	17.41	12.69	17.41	12.69	17.41
Food & Tobacco	16.02	20.99	16.02	20.99	16.02	20.99
Construction	12.97	24.84	12.97	24.84	12.97	24.84
Capital Goods	11.88	25.02	11.88	25.02	11.88	25.02
Transportation	10.97	24.40	10.97	24.40	10.97	24.40
Utilities	12.13	17.33	12.13	17.33	12.13	17.33
Textiles & Trade	14.18	31.28	14.18	31.28	14.18	31.28
Services	14.22	32.55	14.22	32.55	14.22	32.55
Leisure	15.50	30.15	15.50	30.15	15.50	30.15
Risk-Free	7.49	2.71	7.49	2.71	7.49	2.71
Inflation	6.12	3.15	6.12	3.15	6.12	3.15
Power -75	7.86	2.80	7.61	2.75	7.51	2.71
Power -50	8.04	2.94	7.67	2.78	7.52	2.72
Power -30	8.39	3.34	7.79	2.84	7.54	2.73
Power -15	9.20	4.74	8.07	3.07	7.59	2.75
Power -10	9.95	6.29	8.34	3.35	7.63	2.79
Power -5	11.82	10.68	9.04	4.29	7.75	2.89
Power -2	13.88	17.46	10.36	6.53	8.01	3.25
Power 0	15.31	23.68	12.85	11.82	8.87	5.11
Power 0.5	15.70	26.33	12.92	13.55	9.55	7.19
Power 1	14.47	26.20	12.29	14.95	10.98	9.78
Portfolio E2	9.20	5.11	9.20	5.11	9.20	5.11
Portfolio E4	10.69	9.38	10.69	9.38	10.69	9.38
Portfolio E6	11.95	13.89	11.95	13.89	11.95	13.89
Portfolio E8	12.97	18.49	12.97	18.49	12.97	18.49
Portfolio E10	13.75	23.15	13.75	23.15	13.75	23.15
Portfolio V2	8.12	3.99	8.12	3.99	8.12	3.99
Portfolio V4	8.62	6.87	8.62	6.87	8.62	6.87
Portfolio V6	9.01	10.08	9.01	10.08	9.01	10.08
Portfolio V8	9.26	13.42	9.26	13.42	9.26	13.42
Portfolio V10	9.38	16.84	9.38	16.84	9.38	16.84

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 12a

Geometric Means and Standard Deviations of Annual Returns using 12 Value-Weighted Industry Indices, with Leverage, 1934-86: Disaster States Scenario for J = 1, 6, and 12 (32 quarter estimating period, simple probability assessment)

Portfolio	D. State 1 G.Mean	D. State 1 S.Dev*	D. State 6 G.Mean	D. State 6 S.Dev*	D. State 12 G.Mean	D. State 12 S.Dev*
Petroleum	12.20	18.96	12.20	18.96	12.20	18.96
Finance & Real Estate	12.08	20.29	12.08	20.29	12.08	20.29
Consumer Durables	11.82	23.87	11.82	23.87	11.82	23.87
Basic Industries	10.95	17.67	10.95	17.67	10.95	17.67
Food & Tobacco	11.44	16.17	11.44	16.17	11.44	16.17
Construction	9.61	21.91	9.61	21.91	9.61	21.91
Capital Goods	11.73	20.74	11.73	20.74	11.73	20.74
Transportation	9.31	22.73	9.31	22.73	9.31	22.73
Utilities	10.33	15.50	10.33	15.50	10.33	15.50
Textiles & Trade	11.28	22.98	11.28	22.98	11.28	22.98
Services	12.75	31.39	12.75	31.39	12.75	31.39
Leisure	12.64	28.62	12.64	28.62	12.64	28.62
Risk-Free	3.76	3.47	3.76	3.47	3.76	3.47
Inflation	4.09	3.80	4.09	3.80	4.09	3.80
Power -75	4.75	4.54	4.41	4.21	4.25	4.03
Power -50	5.22	5.71	4.72	5.08	4.49	4.72
Power -30	5.92	7.72	5.29	7.10	4.93	6.44
Power -15	6.90	10.50	5.59	9.11	5.02	8.20
Power -10	7.37	12.39	6.05	10.76	5.40	9.87
Power -5	8.66	14.88	6.43	12.35	5.35	11.79
Power -2	10.81	19.51	7.73	14.47	5.46	12.65
Power 0	13.01	28.85	10.45	19.41	6.04	13.80
Power 0.5	13.69	38.70	12.17	24.11	6.43	14.20
Power 1	13.56	51.43	14.06	40.83	11.39	24.00
Portfolio V2	5.47	4.24	5.47	4.24	5.47	4.24
Portfolio V4	7.07	6.99	7.07	6.99	7.07	6.99
Portfolio V6	8.56	10.24	8.56	10.24	8.56	10.24
Portfolio V8	9.94	13.66	9.94	13.66	9.94	13.66
Portfolio V10	11.21	17.16	11.21	17.16	11.21	17.16
Portfolio V12	11.93	20.69	11.93	20.69	11.93	20.69
Portfolio V14	12.65	24.15	12.65	24.15	12.65	24.15
Portfolio V16	13.18	27.11	13.18	27.11	13.18	27.11
Portfolio V18	13.57	30.00	13.57	30.00	13.57	30.00
Portfolio V20	14.04	32.34	14.04	32.34	14.04	32.34

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 12b

Geometric Means and Standard Deviations of Annual Returns using 12 Value-Weighted Industry Indices, with Leverage, 1966-86: Disaster States Scenario for J = 1, 6, and 12 (32 quarter estimating period, simple probability assessment)

Portfolio	D. State 1 G.Mean	D. State 1 S.Dev*	D. State 6 G.Mean	D. State 6 S.Dev*	D. State 12 G.Mean	D. State 12 S.Dev*
Petroleum	10.93	21.21	10.93	21.21	10.93	21.21
Finance & Real Estate	10.68	18.75	10.68	18.75	10.68	18.75
Consumer Durables	8.17	23.83	8.17	23.83	8.17	23.83
Basic Industries	8.58	15.15	8.58	15.15	8.58	15.15
Food & Tobacco	12.96	17.39	12.96	17.39	12.96	17.39
Construction	7.99	22.18	7.99	22.18	7.99	22.18
Capital Goods	7.92	20.54	7.92	20.54	7.92	20.54
Transportation	7.03	20.85	7.03	20.85	7.03	20.85
Utilities	9.68	13.69	9.68	13.69	9.68	13.69
Textiles & Trade	9.60	26.96	9.60	26.96	9.60	26.96
Services	10.67	28.10	10.67	28.10	10.67	28.10
Leisure	12.31	30.18	12.31	30.18	12.31	30.18
Risk-Free	7.49	2.71	7.49	2.71	7.49	2.71
Inflation	6.12	3.15	6.12	3.15	6.12	3.15
Power -75	7.74	2.83	7.58	2.72	7.50	2.70
Power -50	7.87	2.97	7.62	2.74	7.51	2.70
Power -30	8.10	3.33	7.70	2.79	7.52	2.70
Power -15	8.65	4.54	7.90	2.96	7.55	2.70
Power -10	9.15	5.87	8.08	3.20	7.57	2.70
Power -5	10.11	9.17	8.54	4.01	7.64	2.76
Power -2	11.25	15.13	9.33	5.71	7.77	2.97
Power 0	10.29	23.29	11.08	9.73	7.93	3.72
Power 0.5	8.20	29.33	11.29	11.09	7.40	3.29
Power 1	6.04	35.04	12.41	14.77	7.84	5.01
Portfolio V2	8.12	3.99	8.12	3.99	8.12	3.99
Portfolio V4	8.62	6.87	8.62	6.87	8.62	6.87
Portfolio V6	9.01	10.08	9.01	10.08	9.01	10.08
Portfolio V8	9.26	13.42	9.26	13.42	9.26	13.42
Portfolio V10	9.38	16.84	9.38	16.84	9.38	16.84
Portfolio V12	8.77	20.39	8.77	20.39	8.77	20.39
Portfolio V14	8.43	23.79	8.43	23.79	8.43	23.79
Portfolio V16	8.12	26.87	8.12	26.87	8.12	26.87
Portfolio V18	7.74	29.78	7.74	29.78	7.74	29.78
Portfolio V20	7.15	32.90	7.15	32.90	7.15	32.90

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 12c

Geometric Means and Standard Deviations of Annual Returns using 12 Value-Weighted Industry Indices, without Leverage, 1934-86: Disaster States Scenario for J = 1, 6, and 12 (32 quarter estimating period, simple probability assessment)

Portfolio	D. State 1 G.Mean	D. State 1 S.Dev*	D. State 6 G.Mean	D. State 6 S.Dev*	D. State 12 G.Mean	D. State 12 S.Dev*
Petroleum	12.20	18.96	12.20	18.96	12.20	18.96
Finance & Real Estate	12.08	20.29	12.08	20.29	12.08	20.29
Consumer Durables	11.82	23.87	11.82	23.87	11.82	23.87
Basic Industries	10.95	17.67	10.95	17.67	10.95	17.67
Food & Tobacco	11.44	16.17	11.44	16.17	11.44	16.17
Construction	9.61	21.91	9.61	21.91	9.61	21.91
Capital Goods	11.73	20.74	11.73	20.74	11.73	20.74
Transportation	9.31	22.73	9.31	22.73	9.31	22.73
Utilities	10.33	15.50	10.33	15.50	10.33	15.50
Textiles & Trade	11.28	22.98	11.28	22.98	11.28	22.98
Services	12.75	31.39	12.75	31.39	12.75	31.39
Leisure	12.64	28.62	12.64	28.62	12.64	28.62
Risk-Free	3.76	3.47	3.76	3.47	3.76	3.47
Inflation	4.09	3.80	4.09	3.80	4.09	3.80
Power -75	4.75	4.54	4.41	4.21	4.25	4.03
Power -50	5.22	5.71	4.72	5.08	4.49	4.72
Power -30	5.92	7.72	5.29	7.10	4.93	6.44
Power -15	6.46	8.75	5.42	8.28	5.03	8.07
Power -10	7.00	9.60	5.63	8.47	4.99	8.26
Power -5	8.26	12.03	6.14	9.36	5.05	8.60
Power -2	9.71	15.34	7.02	10.95	5.33	9.25
Power 0	10.37	22.87	9.96	15.95	5.62	9.82
Power 0.5	10.19	25.75	10.80	19.54	6.10	10.35
Power 1	10.77	28.24	11.29	21.25	8.34	15.07
Portfolio V2	5.47	4.24	5.47	4.24	5.47	4.24
Portfolio V4	7.07	6.99	7.07	6.99	7.07	6.99
Portfolio V6	8.56	10.24	8.56	10.24	8.56	10.24
Portfolio V8	9.94	13.66	9.94	13.66	9.94	13.66
Portfolio V10	11.21	17.16	11.21	17.16	11.21	17.16

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 12d

Geometric Means and Standard Deviations of Annual Returns using 12 Value-Weighted Industry Indices, without Leverage, 1966-86: Disaster States Scenarion for J = 1, 6, and 12 (32 quarter estimating period, simple probability assessment)

Portfolio	D. State 1 G.Mean	D. State 1 S.Dev*	D. State 6 G.Mean	D. State 6 S.Dev*	D. State 12 G.Mean	D. State 12 S.Dev*
Petroleum	10.93	21.21	10.93	21.21	10.93	21.21
Finance & Real Estate	10.68	18.75	10.68	18.75	10.68	18.75
Consumer Durables	8.17	23.83	8.17	23.83	8.17	23.83
Basic Industries	8.58	15.15	8.58	15.15	8.58	15.15
Food & Tobacco	12.96	17.39	12.96	17.39	12.96	17.39
Construction	7.99	22.18	7.99	22.18	7.99	22.18
Capital Goods	7.92	20.54	7.92	20.54	7.92	20.54
Transportation	7.03	20.85	7.03	20.85	7.03	20.85
Utilities	9.68	13.69	9.68	13.69	9.68	13.69
Textiles & Trade	9.60	26.96	9.60	26.96	9.60	26.96
Services	10.67	28.10	10.67	28.10	10.67	28.10
Leisure	12.31	30.18	12.31	30.18	12.31	30.18
Risk-Free	7.49	2.71	7.49	2.71	7.49	2.71
Inflation	6.12	3.15	6.12	3.15	6.12	3.15
Power -75	7.74	2.83	7.58	2.72	7.50	2.70
Power -50	7.87	2.97	7.62	2.74	7.51	2.70
Power -30	8.10	3.33	7.70	2.79	7.52	2.70
Power -15	8.65	4.54	7.90	2.96	7.55	2.70
Power -10	9.15	5.87	8.08	3.20	7.57	2.70
Power -5	10.11	9.17	8.54	4.01	7.64	2.76
Power -2	10.45	14.09	9.31	5.66	7.77	2.97
Power 0	9.48	18.28	10.78	9.15	7.84	3.49
Power 0.5	7.64	23.29	10.88	9.20	7.79	4.16
Power 1	6.36	25.76	11.26	8.83	7.99	5.47
Portfolio V2	8.12	3.99	8.12	3.99	8.12	3.99
Portfolio V4	8.62	6.87	8.62	6.87	8.62	6.87
Portfolio V6	9.01	10.08	9.01	10.08	9.01	10.08
Portfolio V8	9.26	13.42	9.26	13.42	9.26	13.42
Portfolio V10	9.38	16.84	9.38	16.84	9.38	16.84

*Standard Deviation is for the variable $\ln(1+r_t)$.

Table 13a

Portfolio Composition and Realized Returns for Power -15 Managing
12 Equal-Weighted Industries, with leverage, 1934-86
(32 quarter estimating period, simple probability assessment approach)

Period	Rp	RL	B	PETR	FINA	COUR	BAST	FTOB	CONS	CAPG	TRAN	UTIL	TEXT	SERV	LEIS
1934-1	1.08	0.97					0.03								
1934-2	-0.16	0.96					0.03	0.01							
1934-3	-0.28	0.96					0.02	0.02							
1934-4	0.45	0.96					0.02	0.01							
1935-1	-0.44	0.97					0.03								
1935-2	0.62	0.96					0.01	0.03							
1935-3	0.76	0.96					0.03	0.01							
1935-4	0.89	0.97					0.03								
1936-1	0.66	0.96					0.04								
1936-2	-0.30	0.96					0.02			0.02					
1936-3	0.66	0.97					0.03								
1936-4	1.03	0.96					0.03			0.01					
1937-1	0.69	0.96					0.04								
1937-2	-0.63	0.96					0.04								
1937-3	-0.62	0.96					0.04								
1937-4	-0.84	0.97					0.03								
1938-1	-0.70	0.97					0.03								
1938-2	1.42	0.97					0.02							0.01	
1938-3	0.21	0.96					0.03							0.01	
1938-4	0.60	0.95					0.02							0.03	
1939-1	-1.10	0.95					0.04							0.01	
1939-2	-0.08	0.96					0.04								
1939-3	2.47	0.96		0.01			0.04								
1939-4	-0.64	0.93		0.01			0.05	0.01							
1940-1	0.05	0.93		0.01			0.06								
1940-2	-1.68	0.92					0.04	0.04							
1940-3	0.87	0.93					0.07								
1940-4	0.46	0.93					0.02			0.04					
1941-1	-0.33	0.91					0.02			0.07					
1941-2	0.20	0.91								0.09					
1941-3	0.42	0.92								0.08					
1941-4	-1.42	0.91								0.09					
1942-1	0.46	0.92								0.06				0.02	
1942-2	0.10	0.93								0.07					
1942-3	0.80	0.92								0.08					
1942-4	1.61	0.91								0.08				0.02	
1943-1	4.85	0.90		0.05										0.05	
1943-2	2.85	0.89		0.01							0.04			0.06	
1943-3	1.29	0.89									0.03			0.08	
1943-4	0.14	0.89									0.02			0.08	
1944-1	2.68	0.90									0.02			0.08	
1944-2	2.44	0.90									0.01			0.09	
1944-3	0.83	0.89						0.01			0.01			0.09	
1944-4	0.63	0.88						0.06						0.06	
1945-1	0.74	0.91						0.02			0.03			0.05	
1945-2	1.67	0.88						0.07			0.01			0.04	
1945-3	1.40	0.85						0.09			0.02			0.03	
1945-4	4.31	0.80						0.17						0.03	
1946-1	2.64	0.73						0.17					0.09	0.02	
1946-2	2.13	0.68						0.09					0.23		
1946-3	-6.75	0.67						0.11					0.22		
1946-4	0.76	0.76						0.17					0.04		0.04
1947-1	-0.69	0.73						0.25							0.02
1947-2	-1.84	0.72						0.22							0.07
1947-3	0.76	0.74		0.07				0.11							0.07
1947-4	0.69	0.79		0.05				0.02							0.14
1948-1	0.62	0.74		0.22										0.03	
1948-2	6.68	0.74		0.25							0.01				0.01
1948-3	-6.71	0.62		0.33											0.05
1948-4	-0.63	0.69		0.23											0.08
1949-1	0.33	0.71		0.23	0.01										0.05
1949-2	-1.74	0.70		0.21											0.08
1949-3	6.11	0.73		0.07	0.17									0.03	
1949-4	2.32	0.73		0.10	0.10									0.07	
1950-1	1.77	0.62		0.12					0.10			0.07		0.09	
1950-2	0.17	0.61		0.14								0.21		0.04	
1950-3	4.61	0.62		0.17								0.14		0.07	
1950-4	2.30	0.63		0.17								0.10		0.10	
1951-1	2.09	0.64		0.21								0.08		0.07	
1951-2	0.83	0.64		0.21					0.01			0.08		0.07	
1951-3	6.76	0.65		0.26				0.02	0.02			0.01		0.03	
1951-4	0.69	0.63		0.26					0.11						
1952-1	4.14	0.62		0.27					0.10						
1952-2	0.21	0.62		0.28					0.09						
1952-3	-1.65	0.64		0.29								0.07			
1952-4	3.19	0.63		0.26								0.11			
1953-1	1.39	0.63		0.24								0.13			
1953-2	-0.96	0.64		0.24								0.12			
1953-3	-1.80	0.69		0.27								0.04			
1953-4	2.63	0.69		0.23								0.08			
1954-1	6.17	0.69		0.22								0.10			
1954-2	1.47	0.69		0.24								0.08			
1954-3	2.97	0.68		0.22								0.11			
1954-4	12.30	0.26		0.10.	0.44							0.21			
1955-1	2.97	0.29		0.04	0.60							0.07			
1955-2	3.86	0.23		0.07	0.45							0.24			
1955-3	-1.08	0.18			0.68							0.24			
1955-4	3.10	0.22		0.01	0.48							0.29			
1956-1	6.08	0.14			0.29							0.66			
1956-2	-0.77	0.16		0.01	0.28				0.06			0.48			
1956-3	-1.46	0.16		0.05					0.33			0.46			
1956-4	4.85		-0.08	0.29								0.69		0.10	
1957-1	4.67		-0.28	0.30								0.77		0.22	
1957-2	1.23		-0.30	0.28								0.76		0.27	
1957-3	-9.92		-0.41	0.48								0.82		0.12	
1957-4	-0.92		-0.07	0.23								0.67		0.26	
1958-1	11.80		-0.07	0.16								0.65		0.26	
1958-2	9.84		-0.16	0.17								0.66		0.31	
1958-3	8.81		-0.38	0.09								0.96		0.32	
1958-4	16.02		-0.36	0.09								0.94		0.32	
1959-1	9.77		-0.11									0.80		0.31	
1959-2	-2.66		-0.11									0.78		0.33	
1959-3	-1.62		-0.11						0.12			0.66		0.43	

Table 13a (continued)

Period	Rp	RL	B	PETR	FIMA	COUR	BASI	FTOB	CONS	CAPG	TRAN	UTIL	TEXT	SERV	LEIS
1959-4	4.09		-0.11						0.09			0.45		0.67	
1960-1	-2.73		-0.11									0.28		0.59	0.24
1960-2	2.09		-0.11									0.42		0.64	0.15
1960-3	1.14		-0.11									0.38		0.34	0.39
1960-4	20.66		-0.43									0.46		0.62	0.35
1961-1	20.39		-0.43									0.31		0.74	0.38
1961-2	1.47		-0.43									0.35		0.69	0.39
1961-3	1.30		-0.43									0.60		0.56	0.38
1961-4	9.07		-0.43									0.41		0.64	0.38
1962-1	-1.11		-0.43									0.37		0.71	0.36
1962-2	-30.91		-0.43									0.61		0.64	0.28
1962-3	6.60											0.66		0.44	
1962-4	9.39											0.68		0.32	
1963-1	6.61											0.76		0.24	
1963-2	2.82											0.80		0.20	
1963-3	1.22											0.60		0.40	
1963-4	0.71											0.82		0.18	
1964-1	1.81											0.86		0.14	
1964-2	4.00											1.00			
1964-3	6.67											1.00			
1964-4	3.35											1.00			
1965-1	4.98											1.00			
1965-2	-4.82											1.00			
1965-3	6.15											1.00			
1965-4	1.46		-0.02									1.02			
1966-1	-0.16	0.02									0.24	0.63	0.21		
1966-2	-3.95	0.14									0.40	0.24	0.21		
1966-3	-9.94	0.27									0.38	0.12	0.23		
1966-4	6.96	0.42									0.22	0.33			0.02
1967-1	8.19	0.35		0.12							0.17	0.37			
1967-2	3.79	0.26		0.36							0.13	0.25			0.01
1967-3	9.14	0.24		0.68								0.12			0.06
1967-4	4.74	0.13		0.87											
1968-1	-2.20	0.15		0.85											
1968-2	18.77	0.09		0.91											
1968-3	7.76			1.00											
1968-4	8.45			1.00											
1969-1	-3.78	0.02		0.98											
1969-2	-4.06	0.13		0.87											
1969-3	-7.85	0.26		0.74											
1969-4	-6.66	0.36		0.65											
1970-1	-0.80	0.60		0.34							0.06				
1970-2	-7.80	0.62		0.26							0.13				
1970-3	12.95	0.63		0.29			0.09								
1970-4	6.20	0.62		0.48											
1971-1	7.87	0.47		0.63											
1971-2	1.30	0.42		0.68											
1971-3	-0.95	0.62		0.48											
1971-4	2.10	0.51		0.49											
1972-1	3.02	0.46		0.64											
1972-2	0.23	0.48		0.49											0.02
1972-3	3.73	0.64		0.36		0.09									
1972-4	4.92	0.64		0.46											
1973-1	-2.91	0.63		0.47											
1973-2	-1.60	0.64		0.36											
1973-3	6.66	0.72		0.28											
1973-4	4.18	0.67		0.33											
1974-1	-2.07	0.70		0.30											
1974-2	-2.04	0.80		0.20											
1974-3	-0.37	0.87		0.13											
1974-4	3.68	0.90		0.10											
1976-1	2.67	0.85		0.16											
1975-2	6.88	0.85		0.15											
1975-3	-0.79	0.81		0.19											
1975-4	0.85	0.89		0.11											
1976-1	3.26	0.88		0.09				0.03							
1976-2	2.18	0.79		0.08			0.13								
1976-3	1.60	0.84		0.10			0.06								
1976-4	2.19	0.85		0.12			0.04								
1977-1	0.70	0.83		0.14			0.01					0.02			
1977-2	3.43	0.82		0.14			0.02					0.03			
1977-3	-0.62	0.76		0.18								0.05			
1977-4	1.82	0.76		0.16								0.09			
1978-1	-0.05	0.75		0.25											
1978-2	3.26	0.76		0.24											
1978-3	6.30	0.62		0.27							0.10				0.01
1978-4	-1.74	0.68		0.21							0.11				
1979-1	6.34	0.83		0.12											0.05
1979-2	6.21	0.80		0.18											0.02
1979-3	6.34	0.72		0.26											0.02
1979-4	6.10	0.70		0.29											0.01
1980-1	1.29	0.72		0.28											
1980-2	7.24	0.83		0.17											
1980-3	11.34	0.68		0.42											
1980-4	8.60	0.64		0.36											
1981-1	0.48	0.71		0.29											
1981-2	-0.34	0.65		0.31											0.04
1981-3	-2.49	0.67		0.20										0.04	0.09
1981-4	6.76	0.80		0.11										0.09	
1982-1	-1.78	0.68		0.03										0.29	
1982-2	3.08	0.77												0.23	
1982-3	8.67	0.68												0.32	
1982-4	19.62	0.18		0.01				0.17				0.23		0.41	
1983-1	14.38	0.30						0.08				0.04		0.68	
1983-2	8.06	0.36												0.64	
1983-3	-2.10	0.35						0.08						0.67	
1983-4	-2.64	0.08										0.28		0.66	
1984-1	-6.05	0.26										0.05		0.69	
1984-2	2.03	0.36		0.04				0.16						0.46	
1984-3	6.73	0.37						0.11						0.47	0.06
1984-4	1.13	0.36						0.10						0.33	0.21
1985-1	11.18	0.14						0.62						0.24	
1985-2	8.63	0.09						0.70						0.21	
1985-3	0.03							0.95						0.05	
1985-4	19.74							1.00							
1986-1	13.79							1.00							
1986-2	8.90		-0.03					1.03							
1986-3	-7.44		-0.04					1.04							
1986-4	3.47		-0.16					0.69				0.67			

Table 13b

Portfolio Composition and Realized Returns for Power 0 Managing
12 Equal-Weighted Industries, with leverage, 1934-86
(32 quarter estimating period, simple probability assessment approach)

Period	Rp	RL	B	PETR	FINA	CDUR	BASI	FTOB	CONS	CAPG	TRAN	UTIL	TEXT	SERV	LEIS
1934-1	18.62	0.37					0.63								
1934-2	-5.68	0.20					0.80								
1334-3	-7.42	0.24					0.70	0.06							
1934-4	8.46	0.33					0.67								
1935-1	-9.95	0.29					0.71								
1935-2	10.89	0.31					0.60	0.19							
1935-3	16.08	0.33					0.67								
1935-4	17.28	0.29					0.71								
1936-1	12.39	0.27					0.73								
1936-2	-7.67	0.26					0.75								
1936-3	12.61	0.30					0.70								
1936-4	21.66	0.29					0.71								
1937-1	13.31	0.26					0.74								
1937-2	-13.36	0.23					0.77								
1937-3	-11.90	0.28					0.72								
1937-4	-17.81	0.35					0.65								
1938-1	-14.63	0.33					0.67								
1938-2	26.73	0.44					0.44							0.12	
1938-3	2.76	0.21					0.70							0.09	
1938-4	10.61	0.04					0.65							0.42	
1939-1	-23.69					0.04	0.96								
1939-2	-1.64	0.19					0.81								
1939-3	62.13	0.12		0.03			0.85								
1939-4	-12.37		-0.24	0.02			1.21								
1940-1	0.72		-0.27	0.02			1.25								
1940-2	-26.29		-0.28				1.28								
1940-3	17.16		-0.44				1.44								
1940-4	6.79		-0.23				1.04			0.19					
1941-1	-8.73		-0.64				1.02			0.63					
1941-2	3.34		-0.62				0.32			1.20					
1941-3	6.76		-0.14							1.14					
1941-4	-20.60		-0.33							1.33					
1942-1	6.98		-0.20							0.90				0.30	
1942-2	0.66									1.00					
1942-3	10.36		-0.09							1.09					
1942-4	20.04		-0.31							1.13				0.18	
1943-1	68.65		-0.42	0.76							0.02			0.64	
1943-2	40.42		-0.64	0.02							0.68			0.84	
1943-3	16.48		-0.62								0.65			1.07	
1943-4	0.42		-0.68								0.38			1.20	
1944-1	36.62		-0.42								0.32			1.09	
1944-2	34.76		-0.46								0.17			1.29	
1944-3	10.67		-0.62								0.22			1.30	
1944-4	7.85		-0.39								0.28			1.11	
1945-1	8.99		-0.24								0.67			0.67	
1945-2	24.84		-0.28					0.13			0.43			0.72	
1945-3	6.82		-0.33								0.82			0.61	
1945-4	26.67		-0.33								0.77			0.66	
1946-1	4.67		-0.33								0.76			0.46	0.13
1946-2	3.40										0.79				0.21
1946-3	-28.39										0.62			0.34	0.04
1946-4	-2.69										0.61				0.45
1947-1	-1.99										0.61			0.03	0.46
1947-2	-13.38		-0.33								0.67				0.77
1947-3	2.68		-0.33								0.63				0.70
1947-4	-6.19		-0.33												1.33
1948-1	-2.74		-0.33	0.19							0.38			0.77	
1948-2	23.33		-0.33	0.48							0.68				0.28
1948-3	-18.46		-0.33	0.62							0.67			0.24	
1948-4	-6.04		-0.33	0.64							0.61				0.18
1949-1	0.81		-0.33	0.41							0.92				
1949-2	-12.13		-1.00	0.90	0.63										0.57
1949-3	36.17		-1.00		1.68									0.32	
1949-4	13.39		-1.00		0.77									1.23	
1950-1	-1.61		-1.00		0.67									1.43	
1950-2	-1.13		-1.00		0.66							0.02		1.32	
1950-3	31.13		-1.00	0.33										1.67	
1950-4	-10.41		-1.00	0.13										1.87	
1951-1	8.99		-1.00	0.76										1.24	
1951-2	-2.60		-0.33	0.49										0.85	
1951-3	24.24		-0.33	1.33											
1951-4	0.87		-0.33	1.33											
1952-1	16.28		-0.33	1.33											
1952-2	-1.43		-0.33	1.33											
1952-3	-10.36		-0.33	1.33											
1952-4	11.02		-0.33	1.33											
1953-1	3.28		-0.33	1.33											
1953-2	-7.21		-1.00	2.00											
1953-3	-18.12		-1.00	2.00											
1953-4	13.00		-1.00	2.00											
1954-1	36.79		-1.00	2.00											
1954-2	6.76		-1.00	2.00											
1954-3	18.10		-1.00	2.00											
1954-4	32.70		-1.00	2.00											
1955-1	4.73		-0.67	1.67											
1955-2	9.95		-0.67	1.40	0.27										
1956-3	-3.19		-0.43	0.48	0.95										
1955-4	10.92		-0.43	0.71	0.72										
1956-1	10.25		-0.43		1.43										
1956-2	-2.23		-0.43	0.68	0.76										
1956-3	-6.17		-0.43	0.35					1.08						
1956-4	11.96		-0.43	1.43											
1957-1	-5.83		-0.43	1.43											
1957-2	14.88		-0.43	1.43											
1957-3	-18.99		-0.43	1.43											
1957-4	-19.82		-0.43	1.43											
1958-1	11.24		-0.43	1.43											
1958-2	22.60		-1.00	1.26	0.76										
1958-3	17.41		-1.00	0.49	1.61										
1958-4	11.68		-0.43		1.43										
1959-1	5.42		-0.11						1.11						
1959-2	2.10		-0.11						0.29					0.82	
1959-3	-6.71		-0.11						0.63					0.58	

Table 13b (continued)

Period	Rp	RL	B	PETR	FINA	COUR	BASI	FTOB	CONS	CAPG	TRAN	UTIL	TEXT	SERV	LEIS
1959-4	3.80		-0.11											1.11	
1960-1	-4.74		-0.11											1.11	
1960-2	-6.02		-0.11											1.11	
1960-3	-0.08		-0.11												1.11
1960-4	23.87		-0.43											0.76	0.67
1961-1	13.63		-0.43											1.38	0.05
1961-2	1.02		-0.43											0.81	0.61
1961-3	-4.40		-0.43											0.64	0.89
1961-4	9.35		-0.43											0.76	0.67
1962-1	-1.82		-0.43											1.13	0.30
1962-2	-33.88		-0.43											1.02	0.41
1962-3	3.68		-0.43											1.43	
1962-4	16.62		-1.00									0.20		1.80	
1963-1	9.07		-1.00									0.74		1.26	
1963-2	4.04		-1.00									1.04		0.96	
1963-3	-3.48		-1.00											2.00	
1963-4	1.61		-1.00									1.02		0.98	
1964-1	-0.17		-0.43									0.77		0.66	
1964-2	5.12		-0.43									1.43			
1964-3	8.79		-0.43									1.43			
1964-4	4.19		-0.43									1.43			
1965-1	6.62		-0.43									1.43			
1965-2	-6.00		-0.43									0.62	0.81		
1965-3	9.15		-0.43									0.75	0.68		
1965-4	9.78		-0.43									0.32	1.10		
1966-1	12.64		-0.43								1.21		0.22		
1966-2	-7.70		-0.43								1.43				
1966-3	-25.08		-0.43								1.43				
1966-4	10.71		-0.43								0.91				0.62
1967-1	33.13		-0.43								1.11				0.32
1967-2	13.69		-0.43								0.70				0.73
1967-3	11.39		-0.43	0.21							0.07				1.15
1967-4	7.17		-0.43	1.30											0.13
1968-1	-6.05		-0.43	1.37											0.05
1968-2	28.39		-0.43	1.43											
1968-3	9.23		-0.25	1.26											
1968-4	10.10		-0.25	1.25											
1969-1	-9.28		-0.26	0.17							1.08				
1969-2	-12.12		-0.26	0.57							0.68				
1969-3	-13.39		-0.25	1.00							0.26				
1969-4	-13.19		-0.26	0.97							0.28				
1970-1	-2.64		-0.25	0.31							0.94				
1970-2	-39.02		-0.26								1.26				
1970-3	42.27		-0.23	0.83							0.40				
1970-4	13.26		-0.64	1.47							0.07				
1971-1	20.27		-0.64	1.64											
1971-2	-0.19		-0.64	1.27											0.27
1971-3	-6.18		-0.64	1.64											
1971-4	4.27		-0.64	1.24							0.09		0.21		
1972-1	8.92		-0.82	1.45									0.27		0.10
1972-2	-2.27		-0.82	1.29											0.63
1972-3	4.49		-0.82	0.09		0.82									
1972-4	15.48		-0.82	1.82											
1973-1	-12.84		-0.64	1.64											
1973-2	-12.23		-0.64	1.64											
1973-3	24.25		-0.33	1.33											
1973-4	9.61		-0.09	1.09											
1974-1	-12.44		-0.07	1.07											
1974-2	-18.11			1.00											
1974-3	-12.03	0.24		0.76											
1974-4	13.09	0.39		0.61											
1975-1	7.35	0.09		0.91											
1975-2	28.34	0.10		0.90											
1975-3	-10.80			1.00											
1975-4	-2.65	0.33		0.67											
1976-1	13.42	0.29		0.65				0.16							
1976-2	5.78			0.36			0.64								
1976-3	3.06	0.04		0.62			0.34								
1976-4	7.07	0.06		0.73			0.21								
1977-1	-1.12			0.85			0.06					0.09			
1977-2	14.40			0.83			0.10					0.07			
1977-3	-7.82			1.00											
1977-4	3.27			0.90								0.10			
1978-1	-6.04		-0.17	1.17											
1978-2	9.29		-0.15	1.15											
1978-3	22.12		-0.83	1.32							0.27				0.24
1978-4	-13.30		-0.30	0.83							0.27				0.20
1979-1	19.65			0.70											0.30
1979-2	17.02			0.92											0.08
1979-3	18.12		-0.04	1.01											0.03
1979-4	17.39		-0.20	1.20											
1980-1	-2.93			1.00											
1980-2	24.36			1.00											
1980-3	42.88		-0.88	1.88											
1980-4	28.75		-0.69	1.69											
1981-1	-7.43			1.00											
1981-2	-13.44		-0.48	1.35										0.13	
1981-3	-13.78		-0.01	0.37										0.63	
1981-4	13.90			0.48										0.52	
1982-1	-17.26		-0.62											1.62	
1982-2	1.77		-0.02											1.02	
1982-3	28.25		-0.64											1.64	
1982-4	61.22		-1.00											2.00	
1983-1	40.32		-1.00											2.00	
1983-2	20.21		-1.00											2.00	
1983-3	-13.92		-1.00											2.00	
1983-4	-10.74		-1.00											2.00	
1984-1	-21.92		-1.00											2.00	
1984-2	1.86		-1.00											2.00	
1984-3	15.25		-1.00											2.00	
1984-4	-3.63		-1.00											1.64	0.36
1985-1	26.38		-1.00											1.70	0.30
1985-2	14.49		-1.00											0.91	1.09
1985-3	-12.90		-1.00											1.11	0.89
1985-4	30.43		-1.00					0.59						1.41	
1986-1	24.42		-1.00					1.67						0.33	
1986-2	15.19		-1.00					2.00							
1986-3	-16.18		-1.00					2.00							
1986-4	7.12		-1.00					2.00							

Table 14a

Portfolio Composition and Realized Returns for Power -15 Managing 12 Equal-Weighted Industries, without leverage, 1934-86 (32 quarter estimating period, simple probability assessment approach)

Period	Rp	RL	B	PETR	FINA	COUR	BASI	FTOB	CONS	CAPG	TRAN	UTIL	TEXT	SERV	LEIS
1934-1	1.08	0.97					0.03								
1934-2	-0.16	0.96					0.03	0.01							
1934-3	-0.28	0.96					0.02	0.02							
1934-4	0.46	0.96					0.02	0.01							
1936-1	-0.44	0.97					0.03								
1935-2	0.62	0.96					0.01	0.03							
1935-3	0.76	0.96					0.03	0.01							
1935-4	0.89	0.97					0.03								
1936-1	0.66	0.96					0.04								
1936-2	-0.30	0.96					0.02			0.02					
1936-3	0.65	0.97					0.03								
1936-4	1.03	0.96					0.03			0.01					
1937-1	0.69	0.96					0.04								
1937-2	-0.63	0.96					0.04								
1937-3	-0.62	0.96					0.04								
1937-4	-0.84	0.97					0.03								
1938-1	-0.70	0.97					0.03								
1938-2	1.42	0.97					0.02							0.01	
1938-3	0.21	0.96					0.03							0.01	
1938-4	0.60	0.95					0.02							0.03	
1939-1	-1.10	0.95					0.04							0.01	
1939-2	-0.08	0.96					0.04								
1939-3	2.47	0.96		0.01			0.04								
1939-4	-0.64	0.93		0.01			0.05	0.01							
1940-1	0.05	0.93		0.01			0.06								
1940-2	-1.68	0.92					0.04	0.04							
1940-3	0.87	0.93					0.07								
1940-4	0.45	0.93					0.02			0.04					
1941-1	-0.33	0.91					0.02			0.07					
1941-2	0.20	0.91								0.09					
1941-3	0.42	0.92								0.08					
1941-4	-1.42	0.91								0.09					
1942-1	0.46	0.92								0.06				0.02	
1942-2	-0.10	0.93								0.07					
1942-3	0.80	0.92								0.08					
1942-4	1.61	0.91								0.08				0.02	
1943-1	4.85	0.90		0.05										0.05	
1943-2	2.85	0.89		0.01							0.04			0.06	
1943-3	1.29	0.89									0.03			0.08	
1943-4	0.14	0.89									0.02			0.08	
1944-1	2.68	0.90									0.02			0.08	
1944-2	2.44	0.90									0.01			0.09	
1944-3	0.83	0.89						0.01			0.01			0.09	
1944-4	0.63	0.88						0.06						0.06	
1946-1	0.74	0.91						0.02			0.03			0.05	
1945-2	1.67	0.88						0.07			0.01			0.04	
1946-3	1.40	0.85						0.09			0.02			0.03	
1946-4	4.31	0.80						0.17						0.03	
1946-1	2.64	0.73						0.17					0.09	0.02	
1946-2	2.13	0.68						0.09					0.23		
1946-3	-6.75	0.67						0.11					0.22		
1946-4	0.75	0.75						0.17					0.04		0.04
1947-1	-0.69	0.73						0.25							0.02
1947-2	-1.84	0.72						0.22							0.07
1947-3	0.76	0.74		0.07				0.11							0.07
1947-4	0.69	0.79		0.05				0.02							0.14
1948-1	0.62	0.74		0.22										0.03	
1948-2	6.68	0.74		0.25							0.01				0.01
1948-3	-6.71	0.62		0.33											0.05
1948-4	-0.63	0.69		0.23											0.08
1949-1	0.33	0.71		0.23	0.01										0.05
1949-2	-1.74	0.70		0.21											0.08
1949-3	6.11	0.73		0.07	0.17									0.03	
1949-4	2.32	0.73		0.10	0.10									0.07	
1950-1	1.77	0.62		0.12					0.10			0.07		0.09	
1950-2	0.17	0.61		0.14								0.21		0.04	
1950-3	4.61	0.62		0.17								0.14		0.07	
1950-4	2.30	0.63		0.17								0.10		0.10	
1951-1	2.09	0.64		0.21								0.08		0.07	
1951-2	0.83	0.64		0.21					0.01			0.08		0.07	
1951-3	6.76	0.65		0.26				0.02	0.02			0.01		0.03	
1951-4	0.69	0.63		0.26					0.11						
1952-1	4.14	0.62		0.27					0.10						
1952-2	0.21	0.62		0.28					0.09						
1952-3	-1.66	0.64		0.29								0.07			
1952-4	3.19	0.63		0.26								0.11			
1953-1	1.39	0.63		0.24								0.13			
1953-2	-0.96	0.64		0.24								0.12			
1953-3	-1.80	0.69		0.27								0.04			
1953-4	2.63	0.69		0.23								0.08			
1954-1	6.17	0.69		0.22								0.10			
1954-2	1.47	0.69		0.24								0.08			
1954-3	2.97	0.68		0.22								0.11			
1954-4	12.30	0.25		0.10	0.44							0.21			
1955-1	2.97	0.29		0.04	0.60							0.07			
1955-2	3.86	0.23		0.07	0.45							0.24			
1956-3	-1.08	0.18			0.68							0.24			
1955-4	3.10	0.22		0.01	0.48							0.29			
1956-1	6.08	0.14			0.29							0.66			
1956-2	-0.77	0.16		0.01	0.28				0.06			0.48			
1956-3	-1.46	0.15		0.05					0.33			0.46			
1956-4	4.69			0.28								0.64		0.08	
1957-1	3.24			0.28								0.60		0.12	
1957-2	1.77			0.25								0.66		0.18	
1957-3	-7.86			0.42								0.66		0.02	
1957-4	-0.95			0.23								0.63		0.24	
1958-1	11.11			0.16								0.61		0.24	
1958-2	8.84			0.16								0.68		0.27	
1958-3	6.42			0.09								0.70		0.21	
1958-4	12.09			0.06	0.03							0.69		0.21	
1959-1	8.89											0.73		0.27	
1959-2	-2.17											0.70		0.30	
1959-3	-1.44								0.12			0.49		0.39	

Table 14a (continued)

Period	Rp	RL	B	PETR	FINA	CDUR	BASI	FTOD	CONS	CAPG	TRAN	UTIL	TEXT	SERV	LEIS
1959-4	4.03											0.61		0.37	0.02
1960-1	-0.74											0.63		0.37	0.10
1960-2	3.60											0.60		0.35	0.05
1960-3	1.61											0.68		0.29	0.14
1960-4	13.40											0.61		0.36	0.13
1961-1	13.35											0.47		0.39	-0.14
1961-2	1.70											0.60		0.38	0.12
1961-3	3.63											0.68		0.30	0.13
1961-4	6.49											0.61		0.34	0.16
1962-1	0.35											0.60		0.36	0.14
1962-2	-19.60											0.66		0.34	0.11
1962-3	2.74	0.69										0.24		0.17	
1962-4	4.32	0.68										0.30		0.12	
1963-1	3.17	0.68										0.32		0.09	
1963-2	1.62	0.68										0.35		0.08	
1963-3	-1.01	0.69										0.26		0.15	
1963-4	0.79	0.69										0.34		0.07	
1964-1	1.26	0.69										0.35		0.06	
1964-2	2.13	0.60										0.40			
1964-3	3.23	0.69										0.41			
1964-4	1.95	0.67										0.43			
1965-1	2.68	0.67										0.43			
1965-2	-1.49	0.67										0.43			
1965-3	2.66	0.60										0.40			
1965-4	1.21	0.66										0.44			
1966-1	0.64	0.62									0.09	0.21	0.08		
1966-2	-0.84	0.67									0.16	0.10	0.08		
1966-3	-3.04	0.72									0.14	0.05	0.09		
1966-4	3.11	0.78									0.08	0.13			0.01
1967-1	3.84	0.75		0.04							0.06	0.14			
1967-2	2.02	0.72		0.13							0.05	0.10			0.01
1967-3	4.09	0.71		0.22								0.05			0.03
1967-4	2.61	0.67		0.33											
1968-1	-0.04	0.68		0.32											
1968-2	7.96	0.65		0.35											
1968-3	3.85	0.61		0.39											
1968-4	4.16	0.60		0.40											
1969-1	-0.49	0.63		0.37											
1969-2	-0.69	0.67		0.33											
1969-3	-1.88	0.72		0.28											
1969-4	-1.04	0.76		0.25											
1970-1	0.93	0.85		0.13							0.02				
1970-2	-1.92	0.86		0.09							0.05				
1970-3	6.88	0.86		0.11			0.03								
1970-4	2.87	0.82		0.18											
1971-1	3.65	0.80		0.20											
1971-2	1.08	0.78		0.22											
1971-3	0.49	0.82		0.18											
1971-4	1.47	0.82		0.18											
1972-1	1.66	0.80		0.20											
1972-2	0.66	0.81		0.18											0.01
1972-3	1.98	0.83		0.13		0.04									
1972-4	2.68	0.83		0.17											
1973-1	-0.26	0.82		0.18											
1973-2	0.39	0.87		0.13											
1973-3	3.74	0.90		0.10											
1973-4	2.68	0.88		0.12											
1974-1	0.44	0.89		0.11											
1974-2	0.63	0.92		0.08											
1974-3	1.07	0.95		0.05											
1974-4	2.51	0.96		0.04											
1976-1	1.98	0.94		0.06											
1976-2	3.09	0.94		0.06											
1976-3	0.67	0.93		0.07											
1975-4	1.27	0.96		0.04											
1976-1	1.99	0.96		0.03				0.01							
1976-2	1.68	0.92		0.03			0.05								
1976-3	1.42	0.94		0.04			0.02								
1976-4	1.69	0.94		0.04			0.01								
1977-1	0.94	0.94		0.05								0.01			
1977-2	1.99	0.93		0.05			0.01					0.01			
1977-3	0.68	0.91		0.07								0.02			
1977-4	1.60	0.91		0.06								0.03			
1978-1	0.93	0.91		0.09											
1978-2	2.23	0.91		0.09											
1978-3	3.46	0.86		0.10							0.04				
1978-4	0.69	0.88		0.08							0.04				
1979-1	3.62	0.94		0.04											0.02
1979-2	3.43	0.93		0.07											0.01
1979-3	3.72	0.90		0.10											0.01
1979-4	3.86	0.89		0.11											0.01
1980-1	2.33	0.89		0.11											
1980-2	6.02	0.94		0.06											
1980-3	6.48	0.84		0.16											
1980-4	4.97	0.87		0.13											
1981-1	2.61	0.89		0.11											
1981-2	1.90	0.87		0.12											0.01
1981-3	1.40	0.87		0.08										0.02	0.03
1981-4	4.61	0.93		0.04										0.03	
1982-1	1.10	0.88		0.01										0.11	
1982-2	3.32	0.91												0.09	
1982-3	6.28	0.88												0.12	
1982-4	8.49	0.69						0.06				0.09		0.16	
1983-1	6.62	0.74						0.03				0.02		0.22	
1983-2	4.39	0.76												0.24	
1983-3	0.64	0.75						0.03						0.21	
1983-4	0.46	0.65										0.11		0.24	
1984-1	-0.84	0.72						0.01				0.02		0.26	
1984-2	2.33	0.76		0.01				0.06						0.17	
1984-3	4.05	0.76						0.04						0.17	0.03
1984-4	2.08	0.76						0.04						0.12	0.08
1986-1	6.46	0.67						0.24						0.09	
1985-2	4.69	0.65						0.27						0.08	
1985-3	1.12	0.60						0.39						0.01	
1986-4	8.93	0.60						0.40							
1986-1	6.80	0.68						0.42							
1986-2	4.73	0.66						0.44							
1986-3	-1.77	0.63						0.39				0.08			
1986-4	2.18	0.48						0.20				0.32			

Table 14b

Portfolio Composition and Realized Returns for Power 0 Managing 12 Equal-Weighted Industries, without leverage, 1934-86 (32 quarter estimating period, simple probability assessment approach)

Period	Rp	RL	B	PETR	FINA	CDUR	BASI	FTOB	CONS	CAPG	TRAN	UTIL	TEXT	SERV	LEIS
1934-1	18.62	0.37					0.63								
1934-2	-6.68	0.20					0.80								
1934-3	-7.42	0.24					0.70	0.06							
1934-4	8.46	0.33					0.67								
1935-1	-9.95	0.29					0.71								
1935-2	10.89	0.31					0.60	0.19							
1935-3	16.08	0.33					0.67								
1935-4	17.28	0.29					0.71								
1936-1	12.39	0.27					0.73								
1936-2	-7.67	0.26					0.76								
1936-3	12.61	0.30					0.70								
1936-4	21.65	0.29					0.71								
1937-1	13.31	0.26					0.74								
1937-2	-13.36	0.23					0.77								
1937-3	-11.90	0.28					0.72								
1937-4	-17.81	0.36					0.65								
1538-1	-14.63	0.33					0.67								
1938-2	26.73	0.44					0.44							0.12	
1938-3	2.76	0.21					0.70							0.09	
1938-4	10.61	0.04					0.66							0.42	
1939-1	-23.69					0.04	0.96								
1939-2	-1.64	0.19					0.81								
1939-3	62.13	0.12		0.03			0.86								
1939-4	-9.86						1.00								
1940-1	0.66						1.00								
1940-2	-20.72					0.10	0.90								
1940-3	12.06						1.00								
1940-4	6.32						1.00								
1941-1	-6.66					0.31	0.69								
1941-2	1.63					0.73	0.06			0.21					
1941-3	6.11									1.00					
1941-4	-16.26									1.00					
1942-1	6.05									0.75				0.25	
1942-2	0.65									1.00					
1942-3	9.67									1.00					
1942-4	16.03									0.93				0.07	
1943-1	68.64			0.28							0.18			0.66	
1943-2	22.97										0.63			0.37	
1943-3	7.12										0.47			0.63	
1943-4	0.02										0.30			0.70	
1944-1	26.77										0.27			0.73	
1944-2	24.23										0.10			0.90	
1944-3	7.26										0.13			0.87	
1944-4	6.39										0.23			0.77	
1946-1	7.60										0.64			0.46	
1946-2	22.16										0.44			0.66	
1946-3	1.06										0.78			0.22	
1946-4	19.22										0.71			0.29	
1946-1	2.44										0.72			0.28	
1946-2	3.40										0.79				0.21
1946-3	-28.39										0.62			0.34	0.04
1946-4	-2.69										0.61				0.49
1947-1	-1.99										0.51			0.03	0.46
1947-2	-10.08										0.66				0.44
1947-3	3.18										0.63				0.37
1947-4	-4.49										.				1.00
1948-1	-2.77										0.32			0.68	
1948-2	16.04			0.12							0.61				0.27
1948-3	-12.84			0.19							0.60			0.21	
1948-4	-6.28			0.26							0.68				0.06
1949-1	1.67			0.06							0.94				
1949-2	-6.83			0.11	0.40						0.28			0.10	0.11
1949-3	20.42				0.74									0.26	
1949-4	3.02													1.00	
1960-1	-1.91													1.00	
1960-2	0.94													1.00	
1950-3	16.83													1.00	
1950-4	-6.20													1.00	
1961-1	4.78										0.16			0.84	
1951-2	-3.11			0.24										0.76	
1951-3	18.38			1.00											
1951-4	0.86			1.00											
1952-1	12.42			1.00											
1952-2	-0.86			1.00											
1952-3	-7.65			1.00											
1952-4	8.49			1.00											
1953-1	2.69			1.00											
1953-2	-3.09			1.00											
1953-3	-8.63			1.00											
1953-4	7.03			1.00											
1954-1	18.92			1.00											
1964-2	3.88			1.00											
1964-3	9.65			1.00											
1954-4	16.85			1.00											
1956-1	3.24			1.00											
1956-2	6.62			1.00											
1956-3	-1.70			0.67	0.43										
1956-4	9.98			0.80	0.20										
1966-1	7.62				1.00										
1956-2	0.76			0.78	0.22										
1956-3	-3.29			0.31					0.69						
1966-4	8.78			1.00											
1957-1	-3.67			1.00											
1967-2	10.83			1.00											
1957-3	-12.88			1.00											
1957-4	-13.46			1.00											
1968-1	8.24			1.00											
1968-2	13.80			1.00											
1968-3	7.72			0.79	0.21										
1968-4	8.63				1.00										
1969-1	6.00								1.00						
1969-2	1.94								0.24					0.76	
1969-3	-6.03								0.49					0.61	

Table 14b (continued)

Period	Rp	RL	B	PETR	FINA	CDUR	BASI	FTOB	CONS	CAPG	TRAN	UTIL	TEXT	SERV	LEIS
1959-4	3.66													1.00	
1960-1	-4.10													1.00	
1960-2	-4.36													1.00	
1960-3	0.07														1.00
1960-4	16.94													0.61	0.49
1961-1	9.27													1.00	
1961-2	1.10													0.66	0.44
1961-3	-2.95													0.30	0.70
1961-4	6.89													0.60	0.60
1962-1	-0.72													0.88	0.12
1962-2	-22.78													0.76	0.24
1962-3	2.99													1.00	
1962-4	8.93													1.00	
1963-1	4.01													1.00	
1963-2	2.66											0.15		0.85	
1963-3	-1.05													1.00	
1963-4	2.62											0.12		0.88	
1964-1	-0.42											0.39		0.61	
1964-2	4.00											1.00			
1964-3	6.57											1.00			
1964-4	3.35											1.00			
1965-1	4.98											1.00			
1965-2	-3.21											0.13	0.87		
1965-3	7.80											0.25	0.75		
1965-4	9.00												1.00		
1966-1	10.60										1.00				
1966-2	-4.90										1.00				
1966-3	-17.02										1.00				
1966-4	7.90										0.67				0.33
1967-1	22.07										0.89				0.11
1967-2	10.66										0.42				0.68
1967-3	7.67														1.00
1967-4	6.93			0.77											0.23
1968-1	-3.66			0.84											0.15
1068-2	20.43			1.00											
1968-3	7.76			1.00											
1968-4	8.40			0.96							0.04				
1969-1	-7.63										1.00				
1969-2	-11.04			0.24							0.76				
1969-3	-9.65			0.66							0.34				
1969-4	-10.40			0.63							0.37				
1970-1	-0.26										1.00				
1970-2	-30.77										1.00				
1970-3	34.39			0.46							0.64				
1970-4	10.33			0.61							0.39				
1971-1	13.78			1.00											
1971-2	-1.92			0.45											0.66
1971-3	-3.32			0.82											0.18
1971-4	3.89			0.40							0.33		0.20		0.06
1972-1	10.26			0.18									0.28		0.64
1972-2	-1.08														1.00
1972-3	-6.08					0.74									0.26
1972-4	7.96			0.81											0.19
1973-1	-7.70			1.00											
1973-2	-7.22			1.00											
1973-3	18.93			1.00											
1973-4	9.06			1.00											
1974-1	-11.46			1.00											
1974-2	-18.11			1.00											
1974-3	-12.03	0.24		0.76											
1974-4	13.09	0.39		0.61											
1975-1	7.36	0.09		0.91											
1975-2	28.34	0.10		0.90											
1975-3	-10.80			1.00											
1975-4	-2.66	0.33		0.67											
1976-1	13.42	0.29		0.65				0.16							
1976-2	6.78			0.36			0.64								
1976-3	3.06	0.04		0.62			0.34								
1976-4	7.07	0.06		0.73			0.21								
1977-1	-1.12			0.85			0.06					0.09			
1977-2	14.40			0.83			0.10					0.07			
1977-3	-7.92			1.00											
1977-4	3.27			0.90								0.10			
1978-1	-4.84			1.00											
1978-2	8.37			1.00											
1978-3	12.62			0.67											0.33
1978-4	-9.43			0.61							0.11				0.28
1979-1	19.65			0.70											0.30
1979-2	17.02			0.92											0.08
1979-3	17.63			0.98											0.02
1979-4	15.09			1.00											
1980-1	-2.93			1.00											
1980-2	24.36			1.00											
1980-3	24.16			1.00											
1980-4	18.69			1.00											
1981-1	-7.43			1.00											
1981-2	-7.66			0.92										0.08	
1981-3	-13.63			0.37										0.63	
1981-4	13.90			0.48										0.62	
1982-1	-10.02													1.00	
1982-2	1.81													1.00	
1982-3	19.63													1.00	
1982-4	32.06													1.00	
1983-1	21.60													1.00	
1983-2	11.43													1.00	
1983-3	-6.66													1.00	
1983-4	-3.96													1.00	
1984-1	-9.62													1.00	
1984-2	2.47													1.00	
1984-3	9.26													1.00	
1984-4	-0.48													1.00	
1985-1	13.83													1.00	
1985-2	8.33													0.60	0.40
1985-3	-4.47													0.82	0.18
1985-4	15.06													1.00	
1986-1	12.23							0.26						0.74	
1986-2	7.67							0.77						0.23	
1986-3	-7.05							1.00							
1986-4	4.64							1.00							

Table 15a

Portfolio Composition and Realized Returns for Power -15 Managing
12 Value-Weighted Industries, with leverage, 1934-86
(32 quarter estimating period, simple probability assessment approach)

Period	Rp	RL	B	PETR	FINA	CDUR	BASI	FTOD	CONS	CAPG	TRAN	UTIL	TEXT	SERV	LEIS
1934-1	0.62	0.97				0.03									
1934-2	-0.31	0.96				0.02		0.02							
1934-3	0.00	0.94						0.06							
1934-4	0.60	0.95						0.05							
1936-1	-0.21	0.94						0.05							
1936-2	0.76	0.96						0.03		0.02					
1935-3	0.66	0.96								0.04					
1935-4	0.64	0.96								0.04					
1936-1	0.45	0.96				0.01				0.02					
1936-2	-0.07	0.96								0.04					
1936-3	0.26	0.96								0.04					
1936-4	0.40	0.97				0.01				0.02					
1937-1	0.05	0.96								0.04					
1937-2	-0.21	0.98							0.02						
1937-3	-0.20	0.98							0.02						
1937-4	-0.60	0.98							0.02						
1938-1	-0.67	0.98							0.02						
1938-2	0.90	0.98							0.02						
1938-3	0.37	0.97							0.03						
1938-4	0.34	0.97							0.03						
1939-1	-0.99	0.96							0.04						
1939-2	0.04	0.97							0.03						
1939-3	0.36	0.96							0.04						
1939-4	-0.43	0.93		0.04		0.02			0.01						
1940-1	-0.07	0.94		0.01					0.06						
1940-2	-1.67	0.94							0.06						
1940-3	1.04	0.88					0.08	0.03					0.01		
1940-4	0.19	0.90					0.07						0.03		
1941-1	-0.86	0.88					0.11	0.01							
1941-2	0.64	0.88					0.09						0.03		
1941-3	0.60	0.89					0.09						0.02		
1941-4	-1.78	0.86					0.04						0.10		
1942-1	-1.07	0.90					0.08						0.02		
1942-2	0.18	0.93					0.07								
1942-3	0.68	0.93				0.07									
1942-4	1.20	0.92				0.07								0.01	
1943-1	4.63	0.88		0.01								0.06		0.05	
1943-2	2.78	0.86		0.02		0.01						0.04		0.06	
1943-3	1.02	0.89		0.01		0.02								0.07	
1943-4	0.10	0.89		0.03										0.08	
1944-1	2.18	0.92		0.01										0.08	
1944-2	2.73	0.91												0.09	
1944-3	0.98	0.90												0.10	
1944-4	-0.03	0.91												0.09	
1946-1	0.69	0.91												0.09	
1946-2	1.48	0.91												0.09	
1946-3	1.79	0.89										0.02		0.09	
1946-4	2.60	0.86						0.06			0.01			0.08	
1946-1	4.14	0.73									0.01		0.23	0.03	
1946-2	0.72	0.66									0.08	0.02	0.20		0.05
1946-3	-6.28	0.65									0.07	0.04	0.19		0.05
1946-4	-0.67	0.76									0.02		0.16		0.06
1947-1	-0.73	0.77										0.04	0.11	0.01	0.07
1947-2	-1.11	0.79		0.01							0.03			0.07	0.10
1947-3	-0.68	0.77		0.11										0.01	0.11
1947-4	-0.90	0.82												0.04	0.14
1948-1	-0.16	0.77		0.13										0.06	0.04
1948-2	2.80	0.76		0.13											0.11
1948-3	-4.92	0.66		0.26										0.03	0.16
1948-4	0.26	0.64		0.19										0.02	0.16
1949-1	0.68	0.66		0.19										0.03	0.13
1949-2	-0.60	0.66		0.16										0.04	0.13
1949-3	4.31	0.70		0.10										0.08	0.13
1949-4	2.06	0.71		0.11										0.12	0.06
1950-1	1.19	0.65			0.16								0.07	0.13	
1950-2	0.83	0.66		0.13				0.05					0.16	0.11	
1950-3	6.74	0.60		0.18									0.03	0.18	
1950-4	2.63	0.60		0.17									0.04	0.18	
1961-1	2.34	0.69		0.19			0.01						0.08	0.16	
1951-2	1.17	0.68		0.19									0.09	0.14	
1951-3	5.19	0.60		0.23			0.05							0.12	
1951-4	1.68	0.67		0.22			0.16							0.05	
1952-1	3.39	0.66		0.26			0.14							0.06	
1952-2	0.62	0.66		0.32	0.05		0.09								
1952-3	-2.60	0.67		0.34	0.07		0.02								
1952-4	3.42	0.68		0.29	0.10		0.02								
1953-1	-0.83	0.69		0.26	0.10		0.05								
1963-2	-1.47	0.62		0.23	0.13		0.02								
1953-3	-1.03	0.64		0.26	0.05		0.04								
1953-4	3.27	0.61		0.29								0.09			
1954-1	6.85	0.60		0.29								0.11			
1954-2	1.48	0.69		0.30								0.11			
1954-3	6.10	0.69		0.26		0.01	0.03					0.11			
1954-4	11.41	0.05		0.12	0.31	0.17						0.34		0.01	
1956-1	3.05	0.14		0.07	0.39	0.22						0.13		0.06	
1955-2	6.89			0.09	0.32		0.14					0.40		0.05	
1956-3	0.41				0.23		0.33					0.36		0.08	
1955-4	4.27			0.02	0.07	0.16	0.26					0.40		0.08	
1966-1	6.69					0.17	0.24					0.60		0.09	
1966-2	-2.32					0.14	0.29					0.37		0.21	
1966-3	-1.89					0.07	0.33					0.46		0.14	
1956-4	6.49		-0.21	0.16		0.18	0.12		0.04	0.10		0.27		0.35	
1967-1	2.84		-0.43	0.18		0.17	0.06			0.17		0.41		0.43	
1957-2	4.60		-0.43	0.22		0.13	0.04			0.14		0.42		0.49	
1957-3	-8.93		-0.43	0.26		0.27				0.27		0.33		0.31	
1967-4	-4.06		-0.17	0.18		0.21				0.08		0.23		0.47	
1958-1	8.31		-0.28	0.19		0.06						0.61		0.43	
1958-2	9.96		-0.41	0.19		0.01				0.04		0.69		0.48	
1958-3	10.68		-0.76	0.04						0.19		0.97		0.64	
1968-4	24.42		-0.43	.0.02						0.20		0.78		0.43	
1959-1	11.07		-0.11							0.19		0.65		0.37	
1959-2	1.02		-0.11							0.19		0.62		0.40	
1969-3	-4.37		-0.11			0.03				0.30		0.32		0.46	

Table 15a (continued)

Period	Rp	RL	B	PETR	FINA	CDUR	BASI	FTOB	CONS	CAPG	TRAN	UTIL	TEXT	SERV	LEIS
1959-4	6.67		-0.11			0.08		0.06		0.15		0.48		0.34	
1960-1	0.64		-0.11			0.09		0.23		0.16		0.30		0.33	
1960-2	6.29		-0.11					0.16		0.20		0.43		0.32	
1960-3	-0.23		-0.11					0.26		0.21		0.35		0.30	
1960-4	23.20		-0.43					0.60		0.17		0.32		0.43	
1961-1	17.11		-0.43					0.49		0.17		0.31		0.46	
1961-2	0.47		-0.43					0.47		0.17		0.36		0.43	
1961-3	6.70		-0.43					0.61		0.17		0.44		0.32	
1961-4	10.66		-0.43					0.68		0.20		0.21		0.34	
1962-1	-9.60		-0.43					0.76		0.18		0.18		0.32	
1962-2	-24.35		-0.15					0.22		0.13		0.67		0.12	
1962-3	2.49	0.61		0.04								0.34			
1962-4	4.63	0.62		0.01								0.37			
1963-1	2.43	0.62										0.38			
1963-2	1.23	0.61		0.02								0.37			
1963-3	2.07	0.62		0.01								0.36			
1963-4	1.99	0.62										0.37			
1964-1	1.26	0.62										0.38			
1964-2	2.31	0.63										0.37			
1964-3	1.06	0.61										0.39			
1964-4	1.36	0.61										0.35	0.04		
1965-1	1.59	0.63										0.26	0.11		
1965-2	0.49	0.64										0.19	0.17		
1965-3	1.34	0.65										0.14	0.21		
1965-4	0.92	0.63										0.19	0.18		
1966-1	-0.23	0.65									0.10		0.26		
1966-2	-0.08	0.66									0.19		0.16		
1966-3	-3.60	0.69									0.18		0.13		
1966-4	2.11	0.82								0.10	0.02		0.07		
1967-1	4.67	0.82		0.02						0.13	0.04				
1967-2	1.80	0.76		0.09						0.16					
1967-3	3.13	0.76		0.11						0.13					
1967-4	2.39	0.71		0.16						0.13					
1968-1	-0.72	0.73		0.14						0.14					
1968-2	4.20	0.68		0.24						0.08					
1968-3	4.49	0.62		0.35						0.03					
1968-4	2.92	0.60		0.36						0.02	0.02				
1969-1	0.86	0.63		0.32							0.05				
1969-2	-0.97	0.67		0.31						0.02					
1969-3	-1.31	0.76		0.20						0.05					
1969-4	0.80	0.81		0.12						0.07					
1970-1	0.06	0.90								0.10					
1970-2	-1.61	0.88								0.12					
1970-3	3.67	0.87								0.13					
1970-4	2.67	0.83		0.02						0.16					
1971-1	3.72	0.80		0.03						0.13			0.04		
1971-2	0.73	0.78								0.12			0.09		
1971-3	1.33	0.82								0.10			0.07		
1971-4	2.07	0.81								0.10			0.09		
1972-1	2.65	0.80								0.04			0.11		0.04
1972-2	1.08	0.82								0.02			0.08		0.08
1972-3	0.24	0.86								0.05					0.10
1972-4	1.33	0.83								0.17					
1973-1	0.37	0.84								0.14					0.03
1973-2	0.62	0.86								0.14					
1973-3	1.64	0.90								0.10					
1973-4	0.62	0.93								0.05					0.02
1974-1	1.36	0.96		0.03						0.01					
1974-2	1.68	0.99			0.01										
1974-3	1.67	0.99						0.01							
1974-4	1.81	1.00													
1975-1	1.65	0.99		0.01											
1975-2	1.76	0.97						0.03							
1975-3	1.05	0.94		0.05				0.01							
1975-4	1.42	0.97		0.03											
1976-1	1.49	0.95						0.05							
1976-2	1.35	0.92		0.02			0.06								
1976-3	1.64	0.94		0.05			0.01								
1976-4	1.38	0.94		0.05				0.01							
1977-1	0.61	0.93		0.05				0.01							
1977-2	1.65	0.94		0.03								0.03			
1977-3	0.76	0.92		0.06								0.02			
1977-4	1.43	0.92		0.06								0.03			
1978-1	0.83	0.91		0.09											
1978-2	1.86	0.91		0.09											
1978-3	3.11	0.89		0.09											0.03
1978-4	1.42	0.91		0.06											0.02
1979-1	2.69	0.98		0.01											0.01
1979-2	2.63	0.97		0.03											
1979-3	3.13	0.93		0.07											
1979-4	2.98	0.91		0.09											
1980-1	3.23	0.94		0.06											
1980-2	4.12	0.96		0.04											
1980-3	3.96	0.83		0.17											
1980-4	4.83	0.88		0.12											
1981-1	2.47	0.93		0.07											
1981-2	2.65	0.93		0.05										0.02	
1981-3	2.74	0.94												0.06	
1981-4	3.80	0.98												0.02	
1982-1	1.84	0.93												0.07	
1982-2	3.36	0.96												0.04	
1982-3	5.04	0.92												0.08	
1982-4	8.62	0.76										0.03		0.22	
1983-1	5.49	0.77												0.23	
1983-2	3.71	0.78												0.22	
1983-3	0.24	0.78												0.22	
1983-4	-0.29	0.69										0.07		0.26	
1984-1	0.06	0.77												0.23	
1984-2	2.16	0.80		0.04										0.16	
1984-3	3.41	0.82												0.18	
1984-4	2.12	0.82												0.18	
1985-1	6.64	0.73		0.01				0.12						0.16	
1985-2	4.28	0.62		0.04				0.23						0.12	
1985-3	-0.36	0.62		0.07				0.36						0.06	
1985-4	8.72	0.61		0.10				0.38							
1986-1	9.20	0.46		0.10				0.44							
1986-2	10.31	0.37		0.12				0.60							
1986-3	-4.27	0.36		0.13				0.62							
1986-4	3.47	0.38		0.16				0.33				0.13			

Table 15b

Portfolio Composition and Realized Returns for Power 0 Managing 12 Value-Weighted Industries, with leverage, 1934-86
(32 quarter estimating period, simple probability assessment approach)

Period	Rp	RL	B	PETR	FINA	CDUR	BASI	FTOB	CONS	CAPG	TRAN	UTIL	TEXT	SERV	LEIS
1934-1	6.26	0.49				0.61									
1934-2	-8.82	0.32				0.63		0.15							
1934-3	-1.25	0.09				0.11		0.80							
1934-4	7.29	0.10						0.90							
1935-1	-4.95	0.14				0.11		0.75							
1935-2	12.26	0.30						0.40		0.30					
1935-3	8.90	0.37								0.63					
1935-4	8.60	0.38								0.62					
1936-1	7.31	0.42				0.31				0.26					
1936-2	-1.98	0.32								0.68					
1936-3	4.24	0.37				0.09				0.64					
1936-4	6.07	0.45				0.26				0.28					
1937-1	0.63	0.42				0.09				0.49					
1937-2	-6.19	0.65							0.46						
1937-3	-4.84	0.69							0.41						
1937-4	-10.09	0.62							0.38						
1938-1	-10.88	0.66							0.44						
1938-2	16.87	0.73							0.27						
1938-3	6.77	0.48							0.62						
1938-4	6.29	0.39							0.61						
1939-1	-19.01	0.21							0.79						
1939-2	0.70	0.38							0.62						
1939-3	6.89	0.31							0.69						
1939-4	-0.80			0.17		0.20			0.62						
1940-1	-1.49		-0.12						1.12						
1940-2	-28.96		-0.18						1.18						
1940-3	19.07		-0.65			0.61	1.12						0.03		
1940-4	-0.69		-0.33				0.62		0.69				0.12		
1941-1	-14.67		-0.91				1.91								
1941-2	6.86		-0.84			0.28	1.42						0.16		
1941-3	4.91		-0.35				1.30						0.04		
1941-4	-21.97		-0.76				0.64						1.21		
1942-1	-14.70		-0.26				1.23						0.03		
1942-2	1.77					0.12	0.82							0.06	
1942-3	9.10					1.00									
1942-4	15.70		-0.16			0.96								0.19	
1943-1	65.31		-0.64	0.06		0.02						0.63		0.82	
1943-2	40.97		-0.90	0.21		0.05						0.63		1.01	
1943-3	16.64		-0.39			0.19								1.20	
1943-4	0.77		-0.43	0.21										1.22	
1944-1	32.13		-0.18											1.18	
1944-2	38.35		-0.34											1.34	
1944-3	12.80		-0.41											1.41	
1944-4	-1.72		-0.31											1.31	
1945-1	8.62		-0.27											1.27	
1945-2	20.16		-0.26											1.26	
1945-3	22.76		-0.33											1.33	
1945-4	26.78		-0.33											1.33	
1946-1	7.34		-0.33								0.01			1.29	0.04
1946-2	12.29													0.77	0.23
1946-3	-23.12													0.84	0.16
1946-4	-4.06													0.66	0.44
1947-1	-3.47													0.62	0.38
1947-2	-10.23		-0.33											1.27	0.07
1947-3	-1.40		-0.33											0.46	0.87
1947-4	-6.98		-0.33											0.66	0.68
1948-1	-8.90		-0.33											1.20	0.13
1948-2	-1.19		-0.33											0.17	1.16
1948-3	-13.47		-0.33											0.87	0.47
1948-4	-1.77		-0.33											0.64	0.79
1949-1	3.31		-0.33											0.92	0.41
1949-2	6.77		-1.00	0.05										1.13	0.83
1949-3	37.84		-1.00											1.42	0.68
1949-4	12.98		-1.00											2.00	
1950-1	7.94		-1.00											2.00	
1950-2	0.32		-1.00											2.00	
1950-3	20.98		-1.00											2.00	
1950-4	-6.06		-1.00											2.00	
1951-1	11.67		-1.00											2.00	
1951-2	-4.82		-0.33											1.33	
1951-3	6.13		-0.33	0.13										1.21	
1951-4	6.43		-0.33	0.84										0.49	
1952-1	13.78		-0.33	1.02										0.32	
1952-2	0.80		-0.33	1.33											
1952-3	-10.85		-0.33	1.33											
1952-4	9.28		-0.33	1.33											
1953-1	-4.63		-0.33	1.33											
1953-2	-9.33		-1.00	1.68	0.42										
1953-3	-10.08		-1.00	2.00											
1953-4	15.38		-1.00	2.00											
1954-1	32.69		-1.00	2.00											
1954-2	4.70		-1.00	2.00											
1954-3	29.46		-1.00	2.00											
1954-4	26.23		-1.00	1.12		0.88									
1955-1	4.72		-0.67	0.68		1.09									
1955-2	16.19		-0.67	0.91		0.76									
1955-3	14.60		-0.43			1.43									
1955-4	8.28		-0.43			1.43									
1956-1	6.22		-0.43			1.43									
1956-2	-4.70		-0.43	0.22		1.21									
1956-3	1.32		-0.43			1.43									
1956-4	1.62		-0.43			1.43									
1957-1	-7.32		-0.43	0.40		1.03									
1957-2	16.05		-0.43	0.85		0.68									
1957-3	-16.81		-0.43	0.95		0.48									
1957-4	-13.86		-0.43	0.49		0.94									
1958-1	6.39		-0.43	1.43											
1958-2	20.37		-1.00	2.00											
1958-3	11.63		-1.00	1.83						0.17					
1958-4	20.38		-0.43	0.40						1.03					
1959-1	3.27		-0.11							1.11					
1959-2	12.02		-0.11							0.89				0.22	
1959-3	-6.39		-0.11							1.11					

Table 15b (continued)

Period	Rp	RL	B	PETR	FINA	COUR	BASI	FTOB	CONS	CAPG	TRAN	UTIL	TEXT	SERV	LEIS
1959-4	11.15		-0.11							1.03				0.08	
1960-1	-2.66		-0.11							1.11					
1960-2	12.08		-0.11							1.11					
1960-3	-7.74		-0.11							1.11					
1960-4	17.61		-0.43							1.16				0.27	
1961-1	10.10		-0.43							0.36				1.06	
1961-2	-0.27		-0.43							0.98				0.46	
1961-3	6.77		-0.43							1.43					
1961-4	10.11		-0.43							1.43					
1962-1	-8.18		-0.43							1.43					
1962-2	-41.25		-0.43							1.43					
1962-3	2.63		-0.43							1.26				0.17	
1962-4	20.97		-1.00							1.28		0.72			
1963-1	9.06		-1.00							0.67		1.43			
1963-2	3.90		-1.00							0.47		1.63			
1963-3	6.98		-1.00							0.66		1.45			
1963-4	9.91		-1.00							0.74		1.26			
1964-1	8.91		-0.43							0.94		0.49			
1964-2	6.18		-0.43							1.05		0.38			
1964-3	0.43		-0.43							0.38		1.06			
1964-4	6.60		-0.43									0.31	1.12		
1965-1	6.91		-0.43										1.43		
1965-2	1.26		-0.43										1.43		
1965-3	1.66		-0.43										1.43		
1965-4	6.67		-0.43										1.43		
1966-1	-9.71		-0.43								0.08		1.35		
1966-2	-2.42		-0.43							0.29	1.14				
1966-3	-20.85		-0.43							0.06	0.47				
1966-4	16.62		-0.43							1.43					
1967-1	32.73		-0.43							1.43					
1967-2	8.32		-0.43							1.43					
1967-3	12.27		-0.43							1.43					
1967-4	11.25		-0.43							1.43					
1968-1	-13.02		-0.43							1.43					
1968-2	19.73		-0.43	0.22						1.21					
1968-3	2.84		-0.25	0.42						0.83					
1968-4	1.62		-0.26	0.48						0.77					
1969-1	-6.08		-0.26	0.64						0.11	0.60				
1969-2	-6.68		-0.26	1.00						0.26					
1969-3	-7.89		-0.26	0.69						0.66					
1969-4	0.66		-0.26	0.34						0.91					
1970-1	-9.66		-0.14							1.14					
1970-2	-30.68		-0.16							1.16					
1970-3	21.22		-0.32							1.32					
1970-4	10.37		-0.64							1.64					
1971-1	21.06		-0.64							1.64					
1971-2	-2.91		-0.64							1.41			0.13		
1971-3	-0.76		-0.64							0.88			0.24		0.42
1971-4	10.49		-0.64							0.67			0.34		0.63
1972-1	22.10		-0.82										0.68		1.24
1972-2	6.77		-0.73										0.16		1.68
1972-3	-13.04		-0.63												1.63
1972-4	6.08		-0.82							1.68					0.24
1973-1	-20.66		-0.64							0.39					1.16
1973-2	-10.61		-0.64							1.64					
1973-3	-2.32		-0.14							1.14					
1973-4	-17.67									0.62					0.38
1974-1	-7.49	0.28		0.64						0.18					
1974-2	-3.97	0.76			0.24										
1974-3	-2.39	0.87						0.13							
1974-4	1.81	1.00													
1975-1	2.04	0.87		0.13											
1975-2	6.77	0.60						0.60							
1975-3	-6.30	0.06		0.83				0.12							
1975-4	-0.14	0.69		0.41											
1976-1	6.10	0.23		0.07				0.71							
1976-2	2.30			0.21			0.79								
1976-3	4.89			0.89			0.11								
1976-4	3.67	0.01		0.83				0.18							
1977-1	-6.71			0.84				0.16							
1977-2	7.88	0.01		0.45								0.64			
1977-3	-6.61			0.83								0.17			
1977-4	1.20			0.80								0.20			
1978-1	-6.13			1.00											
1978-2	4.41			1.00											
1978-3	16.68		-0.22	0.79											0.42
1978-4	-6.46			0.65											0.35
1979-1	6.00	0.62		0.18											0.20
1979-2	6.47	0.46		0.64											
1979-3	16.63			1.00											
1979-4	7.79			1.00											
1980-1	7.28	0.01		0.99											
1980-2	10.72	0.42		0.68											
1980-3	21.03		-0.69	1.69											
1980-4	21.69		-0.11	1.11											
1981-1	-13.42			1.00											
1981-2	-4.78			0.73											
1981-3	-11.72	0.11												0.27	
1981-4	4.31	0.76												0.89	
1982-1	-10.86													0.25	
1982-2	1.85	0.29												1.00	
1982-3	23.69													0.71	
1982-4	69.64		-1.00											1.00	
1983-1	30.80		-1.00											2.00	
1983-2	16.31		-1.00											2.00	
1983-3	-17.16		-1.00											2.00	
1983-4	-16.48		-1.00											2.00	
1984-1	-17.24		-1.00											2.00	
1984-2	0.86		-1.00											2.00	
1984-3	12.37		-1.00											2.00	
1984-4	-3.36		-1.00											2.00	
1985-1	30.46		-1.00											2.00	
1985-2	14.88		-1.00											2.00	
1986-3	-26.80		-1.00											2.00	
1985-4	27.38		-1.00											2.00	
1986-1	32.42		-1.00					1.11						1.07	0.93
1986-2	29.32		-1.00					1.26						0.89	
1986-3	-24.84		-1.00					2.00							0.74
1986-4	10.18		-1.00					2.00							

Table 16a

Portfolio Composition and Realized Returns for Power -15 Managing
12 Value-Weighted Industries, without leverage, 1934-86
(32 quarter estimating period, simple probability assessment approach)

Period	Rp	RL	B	PETR	FINA	CDUR	BASI	FTOB	CONS	CAPG	TRAN	UTIL	TEXT	SERV	LEIS
1934-1	0.62	0.97				0.03									
1934-2	-0.31	0.96				0.02		0.02							
1934-3	0.00	0.94						0.06							
1934-4	0.60	0.95						0.05							
1935-1	-0.21	0.94						0.06							
1935-2	0.76	0.96						0.03		0.02					
1935-3	0.66	0.96								0.04					
1935-4	0.64	0.96								0.04					
1936-1	0.45	0.96				0.01				0.02					
1936-2	-0.07	0.96								0.04					
1936-3	0.26	0.96								0.04					
1936-4	0.40	0.97				0.01				0.02					
1937-1	0.06	0.96								0.04					
1937-2	-0.21	0.98							0.02						
1937-3	-0.20	0.98							0.02						
1937-4	-0.60	0.98							0.02						
1938-1	-0.67	0.98							0.02						
1938-2	0.90	0.98							0.02						
1938-3	0.37	0.97							0.03						
1938-4	0.34	0.97							0.03						
1939-1	-0.99	0.96							0.04						
1939-2	0.04	0.97							0.03						
1939-3	0.36	0.96							0.04						
1939-4	-0.43	0.93		0.04		0.02			0.01						
1940-1	-0.07	0.94		0.01					0.06						
1940-2	-1.67	0.94							0.06						
1940-3	1.04	0.88					0.08	0.03					0.01		
1940-4	0.19	0.90					0.07						0.03		
1941-1	-0.86	0.88					0.11	0.01							
1941-2	0.64	0.88					0.09						0.03		
1941-3	0.60	0.89					0.09						0.02		
1941-4	-1.78	0.86					0.04						0.10		
1942-1	-1.07	0.90					0.08						0.02		
1942-2	0.18	0.93					0.07								
1942-3	0.68	0.93				0.07									
1942-4	1.20	0.92				0.07								0.01	
1943-1	4.63	0.88		0.01								0.06		0.05	
1943-2	2.78	0.86		0.02		0.01						0.04		0.06	
1943-3	1.02	0.89		0.01		0.02								0.07	
1943-4	0.10	0.89		0.03										0.08	
1944-1	2.18	0.92		0.01										0.08	
1944-2	2.73	0.91												0.09	
1944-3	0.98	0.90												0.10	
1944-4	-0.03	0.91												0.09	
1945-1	0.69	0.91												0.09	
1946-2	1.48	0.91												0.09	
1945-3	1.79	0.89										0.02		0.09	
1945-4	2.60	0.85						0.06			0.01			0.08	
1946-1	4.14	0.73									0.01		0.23	0.03	
1946-2	0.72	0.65									0.08	0.02	0.20		0.05
1946-3	-6.28	0.65									0.07	0.04	0.19		0.05
1946-4	-0.67	0.76									0.02		0.16		0.06
1947-1	-0.73	0.77										0.04	0.11	0.01	0.07
1947-2	-1.11	0.79		0.01							0.03			0.07	0.10
1947-3	-0.68	0.77		0.11										0.01	0.11
1947-4	-0.90	0.82												0.04	0.14
1948-1	-0.16	0.77		0.13										0.06	0.04
1948-2	2.80	0.76		0.13											0.11
1948-3	-4.92	0.66		0.26										0.03	0.16
1948-4	0.26	0.64		0.19										0.02	0.16
1949-1	0.68	0.66		0.19										0.03	0.13
1949-2	-0.60	0.66		0.16										0.04	0.13
1949-3	4.31	0.70		0.10										0.08	0.13
1949-4	2.06	0.71		0.11										0.12	0.06
1950-1	1.19	0.65			0.16								0.07	0.13	
1950-2	0.83	0.65		0.13				0.05					0.16	0.11	
1950-3	5.74	0.60		0.18									0.03	0.18	
1950-4	2.63	0.60		0.17									0.04	0.18	
1951-1	2.34	0.69		0.19			0.01						0.08	0.16	
1951-2	1.17	0.68		0.19									0.09	0.14	
1951-3	5.19	0.60		0.23			0.05							0.12	
1951-4	1.68	0.67		0.22			0.16							0.05	
1952-1	3.39	0.65		0.26			0.14							0.06	
1952-2	0.62	0.66		0.32	0.05		0.09								
1952-3	-2.60	0.67		0.34	0.07		0.02								
1952-4	3.42	0.68		0.29	0.10		0.02								
1953-1	-0.83	0.69		0.26	0.10		0.05								
1953-2	-1.47	0.62		0.23	0.13		0.02								
1953-3	-1.03	0.64		0.26	0.05		0.04								
1953-4	3.27	0.61		0.29								0.09			
1954-1	6.85	0.60		0.29								0.11			
1954-2	1.48	0.69		0.30								0.11			
1954-3	6.10	0.69		0.26		0.01	0.03					0.11			
1964-4	11.41	0.05		0.12	0.31	0.17						0.34		0.01	
1956-1	3.05	0.14		0.07	0.39	0.22						0.13		0.06	
1955-2	6.89			0.09	0.32		0.14					0.40		0.05	
1056-3	0.41				0.23		0.33					0.36		0.08	
1966-4	4.27			0.02	0.07	0.16	0.26					0.40		0.08	
1956-1	6.69					0.17	0.24					0.60		0.09	
1956-2	-2.32					0.14	0.29					0.37		0.21	
1956-3	-1.89					0.07	0.33					0.46		0.14	
1956-4	4.49			0.15		0.22	0.06		0.12	0.07		0.08		0.30	
1957-1	0.82			0.18		0.26	0.01			0.18		0.06		0.32	
1957-2	6.39			0.21		0.19				0.13		0.08		0.39	
1957-3	-7.23			0.22		0.28				0.26		0.01		0.23	
1957-4	-4.43			0.18		0.23				0.08		0.09		0.43	
1968-1	6.41			0.18		0.08						0.39		0.36	
1958-2	7.41			0.17		0.03				0.06		0.38		0.37	
1958-3	7.13			0.07						0.17		0.41		0.34	
1968-4	17.64			0.03						0.21		0.46		0.32	
1959-1	10.15									0.19		0.46		0.36	
1969-2	1.43									0.20		0.43		0.37	
1969-3	-4.07					0.03				0.30		0.24		0.43	

Table 16a (continued)

Period	Rp	RL	B	PETR	FINA	CDUR	BASI	FTOB	CONS	CAPG	TRAN	UTIL	TEXT	SERV	LEIS
1959-4	6.24					0.08				0.16		0.43		0.33	
1960-1	0.61					0.10		0.17		0.16		0.26		0.32	
1960-2	4.71							0.10		0.21		0.38		0.31	
1960-3	-0.16							0.21		0.22		0.29		0.28	
1960-4	17.17							0.30		0.19		0.13		0.38	
1961-1	11.49							0.29		0.19		0.11		0.41	
1961-2	0.70							0.28		0.20		0.16		0.37	
1961-3	3.48							0.30		0.20		0.21		0.28	
1961-4	7.89							0.49		0.22				0.29	
1962-1	-6.96							0.63		0.20				0.27	
1962-2	-21.49							0.20		0.16		0.63		0.12	
1962-3	2.49	0.61		0.04								0.34			
1962-4	4.63	0.62		0.01								0.37			
1963-1	2.43	0.62										0.38			
1963-2	1.23	0.61		0.02								0.37			
1963-3	2.07	0.62		0.01								0.36			
1963-4	1.99	0.62										0.37			
1964-1	1.26	0.62										0.38			
1964-2	2.31	0.63										0.37			
1964-3	1.06	0.61										0.39			
1964-4	1.36	0.61										0.35	0.04		
1965-1	1.69	0.63										0.26	0.11		
1965-2	0.49	0.64										0.19	0.17		
1965-3	1.34	0.65										0.14	0.21		
1965-4	0.92	0.63										0.19	0.18		
1966-1	-0.23	0.65									0.10		0.26		
1966-2	-0.08	0.66									0.19		0.15		
1966-3	-3.60	0.69									0.18		0.13		
1966-4	2.11	0.82								0.10	0.02		0.07		
1967-1	4.67	0.82		0.02						0.13	0.04				
1967-2	1.80	0.75		0.09						0.16					
1967-3	3.13	0.76		0.11						0.13					
1967-4	2.39	0.71		0.16						0.13					
1968-1	-0.72	0.73		0.14						0.14					
1968-2	4.20	0.68		0.24						0.08					
1968-3	4.49	0.62		0.35						0.03					
1968-4	2.92	0.60		0.36						0.02	0.02				
1969-1	0.86	0.63		0.32							0.05				
1969-2	-0.97	0.67		0.31						0.02					
1969-3	-1.31	0.76		0.20						0.05					
1969-4	0.80	0.81		0.12						0.07					
1970-1	0.95	0.90								0.10					
1970-2	-1.61	0.88								0.12					
1970-3	3.67	0.87								0.13					
1970-4	2.67	0.83		0.02						0.16					
1971-1	3.72	0.80		0.03						0.13			0.04		
1971-2	0.73	0.78								0.12			0.09		
1971-3	1.33	0.82								0.10			0.07		
1971-4	2.07	0.81								0.10			0.09		
1972-1	2.65	0.80								0.04			0.11		0.04
1972-2	1.08	0.82								0.02			0.08		0.08
1972-3	0.24	0.85								0.05					0.10
1972-4	1.33	0.83								0.17					
1973-1	0.37	0.84								0.14					0.03
1973-2	0.62	0.86								0.14					
1973-3	1.64	0.90								0.10					
1973-4	0.62	0.93								0.05					0.02
1974-1	1.35	0.96		0.03						0.01					
1974-2	1.68	0.99			0.01										
1974-3	1.67	0.99						0.01							
1974-4	1.81	1.00													
1975-1	1.65	0.99		0.01											
1975-2	1.76	0.97						0.03							
1975-3	1.05	0.94		0.05				0.01							
1975-4	1.42	0.97		0.03											
1976-1	1.49	0.95						0.05							
1976-2	1.35	0.92		0.02			0.06								
1976-3	1.64	0.94		0.05			0.01								
1976-4	1.38	0.94		0.05				0.01							
1977-1	0.61	0.93		0.05				0.01							
1977-2	1.65	0.94		0.03								0.03			
1977-3	0.76	0.92		0.06								0.02			
1977-4	1.43	0.92		0.06								0.03			
1978-1	0.83	0.91		0.09											
1978-2	1.86	0.91		0.09											
1978-3	3.11	0.89		0.09											0.03
1978-4	1.42	0.91		0.06											0.02
1979-1	2.69	0.98		0.01											0.01
1979-2	2.63	0.97		0.03											
1979-3	3.13	0.93		0.07											
1979-4	2.98	0.91		0.09											
1980-1	3.23	0.94		0.06											
1980-2	4.12	0.96		0.04											
1980-3	3.96	0.83		0.17											
1980-4	4.83	0.88		0.12											
1981-1	2.47	0.93		0.07											
1981-2	2.66	0.93		0.05										0.02	
1981-3	2.74	0.94												0.06	
1981-4	3.80	0.98												0.02	
1982-1	1.84	0.93												0.07	
1982-2	3.36	0.96												0.04	
1982-3	6.04	0.92												0.08	
1982-4	8.62	0.76										0.03		0.22	
1983-1	5.49	0.77												0.23	
1983-2	3.71	0.78												0.22	
1983-3	0.24	0.78												0.22	
1983-4	-0.29	0.69										0.07		0.25	
1984-1	0.06	0.77												0.23	
1984-2	2.16	0.80		0.04										0.16	
1984-3	3.41	0.82												0.18	
1984-4	2.12	0.82												0.18	
1985-1	6.64	0.73		0.01				0.12						0.16	
1985-2	4.28	0.62		0.04				0.23						0.12	
1985-3	-0.36	0.62		0.07				0.36						0.05	
1985-4	8.72	0.61		0.10				0.38							
1986-1	9.20	0.46		0.10				0.44							
1986-2	10.31	0.37		0.12				0.60							
1986-3	-4.27	0.36		0.13				0.62							
1986-4	3.47	0.38		0.16				0.33				0.13			

Table 16b

Portfolio Composition and Realized Returns for Power 0 Managing 12 Value-Weighted Industries, without leverage, 1934-86 (32 quarter estimating period, simple probability assessment approach)

Period	Rp	RL	B	PETR	FINA	CDUR	BASI	FTOB	CONS	CAPG	TRAN	UTIL	TEXT	SERV	LEIS
1934-1	6.26	0.49				0.61									
1934-2	-8.82	0.32				0.53		0.15							
1934-3	-1.26	0.09				0.11		0.80							
1934-4	7.29	0.10						0.90							
1935-1	-4.95	0.14				0.11		0.76							
1935-2	12.26	0.30						0.40		0.30					
1935-3	8.90	0.37								0.63					
1935-4	8.60	0.38								0.62					
1936-1	7.31	0.42				0.31				0.26					
1936-2	-1.98	0.32								0.68					
1936-3	4.24	0.37				0.09				0.64					
1936-4	6.07	0.46				0.26				0.28					
1937-1	0.63	0.42				0.09				0.49					
1937-2	-6.19	0.66							0.46						
1937-3	-4.84	0.69							0.41						
1937-4	-10.09	0.62							0.38						
1938-1	-10.88	0.66							0.44						
1938-2	16.87	0.73							0.27						
1938-3	6.77	0.48							0.62						
1938-4	6.29	0.39							0.61						
1939-1	-19.01	0.21							0.79						
1939-2	0.70	0.38							0.62						
1939-3	6.89	0.31							0.69						
1939-4	-0.80			0.17		0.20			0.62						
1940-1	-1.28								1.00						
1940-2	-24.47								1.00						
1940-3	16.20					1.00									
1940-4	-3.46						0.05		0.95						
1941-1	-9.03					0.44	0.03		0.63						
1941-2	-2.63					1.00									
1941-3	3.62						1.00								
1941-4	-16.28					0.60							0.60		
1942-1	-11.69						1.00								
1942-2	1.77					0.12	0.82							0.06	
1942-3	9.10					1.00									
1942-4	13.74					0.83								0.17	
1943-1	64.19					0.21						0.01		0.77	
1943-2	30.61					0.04								0.96	
1943-3	13.86													1.00	
1943-4	1.26													1.00	
1944-1	27.37													1.00	
1944-2	28.81													1.00	
1944-3	9.21													1.00	
1944-4	-1.19													1.00	
1945-1	6.91													1.00	
1945-2	16.08													1.00	
1945-3	17.19													1.00	
1945-4	20.21													1.00	
1946-1	6.18													1.00	
1946-2	12.29													0.77	0.23
1946-3	-23.12													0.84	0.16
1946-4	-4.96													0.66	0.44
1947-1	-3.47													0.62	0.38
1947-2	-7.61													1.00	
1947-3	0.65													0.47	0.53
1947-4	-4.68													0.66	0.34
1948-1	-7.98													1.00	
1948-2	-0.03													0.18	0.82
1948-3	-10.16													0.80	0.20
1948-4	-1.44													0.49	0.51
1949-1	1.49													0.87	0.13
1949-2	7.49													1.00	
1949-3	26.07													1.00	
1949-4	6.82													1.00	
1950-1	4.30													1.00	
1950-2	0.49													1.00	
1950-3	10.82													1.00	
1950-4	-2.20													1.00	
1951-1	6.21													1.00	
1951-2	-3.42													1.00	
1951-3	2.73													1.00	
1951-4	4.18			0.69										0.41	
1952-1	10.63			0.76										0.24	
1952-2	0.81			1.00											
1952-3	-7.92			1.00											
1952-4	7.19			1.00											
1953-1	-3.17			1.00											
1953-2	-3.40			1.00											
1953-3	-4.61			1.00											
1953-4	8.22			1.00											
1954-1	16.82			1.00											
1954-2	2.85			1.00											
1954-3	15.23			1.00											
1954-4	12.89			0.77		0.23									
1955-1	3.22			0.35		0.64									
1955-2	10.34			0.67		0.33									
1955-3	10.64					1.00									
1955-4	6.14					1.00									
1956-1	4.00					1.00									
1956-2	-3.11			0.09		0.91									
1956-3	1.31					1.00									
1956-4	1.47					1.00									
1957-1	-4.84			0.22		0.78									
1957-2	11.89			0.65		0.35									
1957-3	-11.66			0.76		0.24									
1957-4	-9.26			0.33		0.67									
1958-1	4.15			1.00											
1958-2	10.76			1.00											
1958-3	6.72			1.00											
1958-4	13.73			0.34						0.86					
1959-1	3.06									1.00					
1959-2	11.61									0.85				0.15	
1959-3	-6.62									1.00					

Table 16b (continued)

Period	Rp	RL	B	PETR	FINA	COUR	BASI	FTOB	CONS	CAPG	TRAN	UTIL	TEXT	SERV	LEIS
1959-4	10.42									0.98				0.02	
1960-1	-2.23									1.00					
1960-2	11.03									1.00					
1960-3	-6.82									1.00					
1960-4	10.04									0.99				0.01	
1961-1	6.64									0.18				0.82	
1961-2	0.29									0.80				0.20	
1961-3	6.15									1.00					
1961-4	7.49									1.00					
1962-1	-6.31									1.00					
1962-2	-28.46									1.00					
1962-3	2.49									1.00					
1962-4	11.53									1.00					
1963-1	6.37									1.00					
1963-2	6.03									0.89		0.11			
1963-3	3.98									0.97		0.03			
1963-4	8.61									1.00					
1964-1	9.14									1.00					
1964-2	3.79									1.00					
1964-3	0.05									0.64		0.46			
1964-4	6.86												1.00		
1965-1	4.65												1.00		
1965-2	1.31												1.00		
1965-3	1.69												1.00		
1965-4	6.11												1.00		
1966-1	-7.24												1.00		
1966-2	-1.21									0.20	0.80				
1966-3	-13.12									0.91	0.09				
1966-4	12.18									1.00					
1967-1	23.43									1.00					
1967-2	6.31									1.00					
1967-3	9.08									1.00					
1967-4	8.38									1.00					
1968-1	-9.22									1.00					
1968-2	16.41									1.00					
1968-3	0.39			0.16						0.85					
1968-4	0.61			0.22						0.78					
1969-1	-4.73			0.29						0.11	0.60				
1969-2	-4.47			0.76						0.26					
1969-3	-4.09			0.36						0.66					
1969-4	3.01			0.11						0.89					
1970-1	-8.05									1.00					
1970-2	-26.96									1.00					
1970-3	16.67									1.00					
1970-4	7.47									1.00					
1971-1	14.29									1.00					
1971-2	0.09									0.70					0.30
1971-3	-0.22									0.03					0.97
1971-4	8.86														1.00
1972-1	15.72														1.00
1972-2	5.26														1.00
1972-3	-7.37														1.00
1972-4	13.30														1.00
1973-1	-16.23														1.00
1973-2	-6.17									1.00					
1973-3	-1.72									1.00					
1973-4	-17.67									0.62					0.38
1974-1	-7.49	0.28		0.64						0.18					
1974-2	-3.97	0.76			0.24										
1974-3	-2.39	0.87						0.13							
1974-4	1.81	1.00													
1975-1	2.04	0.87		0.13											
1975-2	6.77	0.60						0.60							
1975-3	-6.30	0.06		0.83				0.12							
1975-4	-0.14	0.69		0.41											
1976-1	5.10	0.23		0.07				0.71							
1976-2	2.30			0.21			0.79								
1976-3	4.89			0.89			0.11								
1976-4	3.67	0.01		0.83				0.16							
1977-1	-6.71			0.84				0.16							
1977-2	7.88	0.01		0.46								0.64			
1977-3	-6.61			0.83								0.17			
1977-4	1.20			0.80								0.20			
1978-1	-6.13			1.00											
1978-2	4.41			1.00											
1978-3	13.17			0.69											0.41
1978-4	-6.46			0.65											0.35
1979-1	6.00	0.62		0.18											0.20
1979-2	6.47	0.46		0.64											
1979-3	16.63			1.00											
1979-4	7.79			1.00											
1980-1	7.28	0.01		0.99											
1980-2	10.72	0.42		0.68											
1980-3	13.64			1.00											
1980-4	19.81			1.00											
1981-1	-13.42			1.00											
1981-2	-4.78			0.73										0.27	
1981-3	-11.72	0.11												0.89	
1981-4	4.31	0.76												0.25	
1982-1	-10.86													1.00	
1982-2	1.85	0.29												0.71	
1982-3	23.69													1.00	
1982-4	31.22													1.00	
1983-1	16.84													1.00	
1983-2	8.98													1.00	
1983-3	-7.17													1.00	
1983-4	-6.83													1.00	
1984-1	-7.18													1.00	
1984-2	1.97													1.00	
1984-3	7.81													1.00	
1984-4	-0.24													1.00	
1985-1	16.60													1.00	
1985-2	8.69													1.00	
1985-3	-12.20													1.00	
1985-4	12.09													1.00	
1986-1	14.44													0.81	0.19
1986-2	13.46														1.00
1986-3	-11.38							1.00							
1986-4	6.07							1.00							

Table 17a

Summary of Portfolio Compositions of Power Policies Managing 12 Equal-Weighted Industries, With Leverage, 1934-86
(32 quarter estimating period, simple probability assessment approach)

Number of Times in:	Powers									
	-75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	103	104	112	111	109	109	108	100	84	60
Finance & R.E.	9	9	9	10	12	15	18	13	6	1
Consumer Durables	1	1	1	1	1	1	1	2	5	7
Basic Industries	23	29	33	34	34	35	35	35	32	5
Food & Tobacco	27	31	37	38	38	37	27	9	5	1
Construction	7	8	8	9	10	12	11	4	6	23
Capital Goods	10	10	10	11	11	11	10	9	6	3
Transportation	13	16	18	20	20	23	31	42	43	42
Utilities	72	76	77	78	78	75	40	16	8	4
Textiles & Trade	7	7	7	7	7	8	11	6	5	10
Services	68	72	74	76	76	75	76	69	66	44
Leisure	23	25	28	33	33	34	36	37	30	19
Lending	212	212	207	189	181	156	94	30	...	...
Borrowing	...	...	...	23	26	35	104	163	198	206
Neither	...	...	5	...	5	21	14	19	14	6
Max. Lent (%)	100	99	98	97	96	92	83	44	...	...
Min. Lent(%)	52	28	6	14	24	1	1	4	...	...
Loss Quarters	21	28	36	44	51	63	71	81	83	83
In 0 Industries	3	...	...	...	...	...	...	...	...	...
In 1 Industry	101	92	74	65	65	65	74	101	136	205
In 2 Industries	63	67	78	84	83	81	93	92	71	7
In 3 Industries	44	51	57	58	59	57	37	19	3	...
In 4 Industries	1	1	2	4	4	8	7	...	1	...
In 5 Industries	...	1	1	1	1	1	1	...	1	...
In 6 Industries	...	...	...	...	...	...	...	...	...	...
In 7 Industries	...	...	...	...	...	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 17b

Summary of Portfolio Compositions of Power Policies Managing 12 Equal-Weighted Industries, Without Leverage, 1934-86
(32 quarter estimating period, simple probability assessment approach)

Number of	Powers									
Times in:	-75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	103	104	112	111	109	109	109	88	71	60
Finance & R.E.	9	9	9	11	14	18	17	8	3	1
Consumer Durables	1	1	1	1	1	1	1	5	15	7
Basic Industries	23	29	33	34	34	35	35	35	23	4
Food & Tobacco	27	31	37	38	38	37	25	7	4	1
Construction	7	8	8	9	11	14	7	4	15	24
Capital Goods	10	10	10	11	11	11	10	7	6	3
Transportation	13	16	18	20	20	23	35	43	45	42
Utilities	72	76	77	78	78	66	25	12	4	4
Textiles & Trade	7	7	7	7	7	8	11	5	4	4
Services	68	72	74	76	74	75	73	71	59	43
Leisure	23	25	28	33	33	34	38	37	23	19
Lending	212	212	207	189	181	156	94	30	...	...
Borrowing	...	...	...	...	...	...	...	...	...	...
Neither	...	...	5	23	31	56	118	182	212	212
Max. Lent (%)	100	99	98	97	96	92	83	44	...	...
Min. Lent(%)	52	28	6	14	24	1	1	4	...	...
Loss Quarters	21	28	36	44	50	65	71	79	81	84
In 0 Industries	3	...	...	...	...	...	...	...	...	...
In 1 Industry	101	92	74	65	65	68	82	118	154	212
In 2 Industries	63	67	78	84	84	81	91	81	56	...
In 3 Industries	44	51	57	57	56	52	34	11	2	...
In 4 Industries	1	1	2	5	6	10	5	1	...	...
In 5 Industries	...	1	1	1	1	1	...	1	...	...
In 6 Industries	...	...	...	...	...	...	...	...	...	...
In 7 Industries	...	...	...	...	...	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 17c

Summary of Portfolio Compositions of Power Policies Managing 12 Value-Weighted Industries, With Leverage, 1934-86
(32 quarter estimating period, simple probability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	83	88	97	100	102	105	100	63	51	40
Finance & R.E.	11	11	12	13	13	15	14	2	1	1
Consumer Durables	15	17	19	26	29	32	32	30	34	28
Basic Industries	25	28	29	30	28	23	14	10	8	...
Food & Tobacco	29	30	33	34	32	28	22	15	8	3
Construction	7	11	12	14	15	15	13	14	18	16
Capital Goods	56	58	60	59	59	56	58	62	54	38
Transportation	8	11	12	13	13	13	13	5	2	1
Utilities	58	60	61	61	56	36	23	14	8	9
Textiles & Trade	29	31	32	32	32	32	27	17	8	7
Services	76	78	80	83	83	80	76	65	61	56
Leisure	20	22	23	23	23	24	24	28	22	21
Lending	212	212	195	183	181	150	103	41	12	1
Borrowing	...	...	...	23	28	41	95	149	171	195
Neither	...	...	17	6	3	21	14	22	29	16
Max. Lent (%)	100	100	100	100	100	100	100	100	100	100
Min. Lent(%)	42	13	1	5	6	1	1	1	3	100
Loss Quarters	24	30	37	46	53	63	72	78	78	72
In 0 Industries	11	7	3	1	1	1	1	1	1	1
In 1 Industry	84	73	68	65	61	60	66	111	156	202
In 2 Industries	57	63	67	69	71	77	96	88	46	9
In 3 Industries	34	43	41	40	47	55	38	10	9	...
In 4 Industries	16	16	23	25	22	15	11	2	...	...
In 5 Industries	7	7	7	8	8	4	...	...	...	...
In 6 Industries	3	3	3	3	1	...	...	...	...	...
In 7 Industries	...	...	...	1	1	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 17d

Summary of Portfolio Compositions of Power Policies Managing 12 Value-Weighted Industries, Without Leverage, 1934-86
(32 quarter estimating period, simple probability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	83	88	97	100	102	106	92	57	48	40
Finance & R.E.	11	11	12	13	15	14	9	1	1	1
Consumer Durables	15	17	19	26	30	32	32	31	30	28
Basic Industries	25	28	29	29	26	23	11	7	3	...
Food & Tobacco	29	30	33	33	32	24	22	13	8	3
Construction	7	11	12	14	15	14	13	15	17	16
Capital Goods	56	58	60	59	57	54	63	58	52	38
Transportation	8	11	12	13	13	13	12	3	2	1
Utilities	58	60	61	59	46	30	20	7	1	...
Textiles & Trade	29	31	32	32	32	32	26	7	6	7
Services	76	78	80	83	83	77	76	64	60	56
Leisure	20	22	23	23	23	24	28	24	21	21
Lending	212	212	195	183	181	150	103	41	12	1
Borrowing	...	...	...	...	...	...	...	...	...	...
Neither	...	...	17	29	31	62	109	171	200	211
Max. Lent (%)	100	100	100	100	100	100	100	100	100	100
Min. Lent(%)	42	13	1	5	6	1	1	1	3	100
Loss Quarters	24	30	37	46	54	62	70	76	76	71
In 0 Industries	11	7	3	1	1	1	1	1	1	1
In 1 Industry	84	73	68	65	61	60	68	140	175	211
In 2 Industries	57	63	67	69	71	83	101	66	34	...
In 3 Industries	34	43	41	42	51	55	34	5	2	...
In 4 Industries	16	16	23	24	22	13	8	...	...	...
In 5 Industries	7	7	7	8	6	...	...	...	...	...
In 6 Industries	3	3	3	2	...	...	...	...	...	...
In 7 Industries	...	...	...	1	...	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 18a

Summary of Portfolio Compositions of Power Policies Managing 8 Equal-Weighted Industries, With Leverage, 1934-86
(32 quarter estimating period, simple probability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Basic Industries	27	30	33	37	38	38	39	40	36	16
Capital Goods	15	16	19	20	20	26	25	18	13	6
Construction	...	...	1	1	1	3	10	14	13	33
Consumer Goods	47	47	49	48	45	43	39	39	30	18
Energy	113	116	121	124	123	119	119	105	102	71
Finance	14	15	15	16	19	22	28	24	19	13
Transportation	18	19	22	25	26	26	29	41	44	48
Utilities	87	87	88	88	89	87	63	24	16	10
Lending	212	212	212	190	181	154	95	29	...	...
Borrowing	...	...	...	11	27	34	103	160	199	206
Neither	...	...	...	11	4	24	14	23	13	6
Max. Lent (%)	100	99	99	97	96	93	85	48	...	...
Min. Lent(%)	67	51	19	1	21	1	1	1	...	...
Loss Quarters	23	29	35	43	52	67	74	80	82	83
In 0 Industries	2	...	...	...	...	...	...	...	...	...
In 1 Industry	116	113	101	92	89	89	95	129	157	209
In 2 Industries	77	80	86	93	98	94	94	73	49	3
In 3 Industries	17	19	25	27	24	29	23	10	6	...
In 4 Industries	...	...	...	...	1	...	...	...	...	...
In 5 Industries	...	...	...	...	...	...	...	...	...	...
In 6 Industries	...	...	...	...	...	...	...	...	...	...
In 7 Industries	...	...	...	...	...	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...

Table 18b

Summary of Portfolio Compositions of Power Policies Managing 8 Value-Weighted Industries, With Leverage, 1934-86
(32 quarter estimating period, simple probability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Basic Industries	34	41	42	46	46	47	40	33	28	11
Capital Goods	53	55	59	64	65	66	64	60	58	47
Construction	3	4	5	5	5	5	7	7	8	20
Consumer Goods	51	53	55	54	51	44	38	24	17	7
Energy	101	111	120	129	129	128	122	107	92	64
Finance	18	18	19	21	22	28	31	21	16	13
Transportation	31	32	34	38	38	38	40	42	41	40
Utilities	84	85	90	91	90	78	60	23	15	8
Lending	212	212	212	183	181	152	100	42	13	2
Borrowing	...	...	...	19	29	40	94	147	173	190
Neither	...	...	...	10	2	20	18	23	26	20
Max. Lent (%)	100	100	100	100	100	100	100	100	100	100
Min. Lent(%)	62	43	6	1	14	1	2	1	11	100
Loss Quarters	22	27	33	47	52	61	72	79	79	77
In 0 Industries	14	8	5	3	3	3	3	2	2	2
In 1 Industry	79	76	67	62	61	60	69	120	153	210
In 2 Industries	71	73	77	70	72	81	90	76	49	...
In 3 Industries	38	43	49	63	64	61	47	12	8	...
In 4 Industries	10	12	14	13	11	6	3	1	...	...
In 5 Industries	...	...	...	1	1	1	...	1	...	...
In 6 Industries	...	...	...	...	...	...	...	...	...	...
In 7 Industries	...	...	...	...	...	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...

Table 19a

Summary of Portfolio Compositions of Power Policies Managing 24 Equal-Weighted Industries, With Leverage, 1934-86
(32 quarter estimating period, simple probability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Banks & Fin. Serv.	...	...	...	...	...	1	3	...	...	...
Chemicals, R. & P.	...	...	...	...	...	...	...	...	...	...
Construction	16	18	20	22	22	22	27	27	29	31
Fabricated M.P.	0	...	...	...	...	...	...	...	...	...
Food	3	3	3	3	3	3	2	...	...	...
Insurance	48	50	54	55	55	54	26	15	13	2
Machinery	3	3	3	3	4	4	2	1	3	...
Metals	1	2	2	2	2	2	5	1	1	...
Mining	42	55	66	73	74	77	75	69	58	12
Oil & Gas Expl.	61	63	66	71	72	74	78	75	64	41
Paper & Wood	4	7	7	7	7	8	8	11	10	...
Petroleum & Coal	47	59	60	58	58	50	34	9	3	...
Railroads & Truck.	1	2	6	7	8	9	10	9	10	9
Real Estate	22	23	24	26	28	34	35	18	5	3
Retail Tr., Food	50	50	51	53	49	40	31	3	...	...
Retail Tr., Others	...	1	1	1	2	2	3	2	2	...
Services, Leisure	18	18	20	24	27	31	39	52	55	50
Services, Others	36	38	39	39	38	38	34	34	19	3
Textile	2	2	2	2	2	2	2	...	...	...
Tobacco	82	85	87	91	90	88	84	64	41	16
Transportation	25	27	32	33	33	33	35	32	29	22
Transportation Eq.	1	1	2	2	2	2	2	1	1	1
Utilities	47	48	48	48	47	34	14	...	...	...
Wholesale Tr.	13	15	22	25	28	30	31	39	45	33
Lending	212	212	209	183	180	137	87	21	...	...
Borrowing	...	...	...	23	31	54	114	172	202	208
Neither	...	...	3	6	1	21	11	19	10	4
Max. Lent (%)	100	99	99	97	95	92	82	39	...	...
Min. Lent(%)	26	4	19	1	4	1	1	2	...	...
Loss Quarters	23	33	35	51	54	68	74	80	87	93
In 0 Industries	4	...	...	...	...	...	...	...	...	...
In 1 Industry	47	28	17	9	9	10	16	56	93	201
In 2 Industries	79	87	74	70	66	67	75	93	84	11
In 3 Industries	28	40	56	62	61	64	81	37	19	...
In 4 Industries	38	38	45	46	54	56	29	22	11	...
In 5 Industries	15	18	18	24	21	12	11	3	4	...
In 6 Industries	1	1	2	1	1	3	...	1	1	...
In 7 Industries	...	...	...	...	...	...	...	...	...	...
....	...	...	...	...	...	...	...	...	...	...
....	...	...	...	...	...	...	...	...	...	...
In 24 Industries	...	...	...	...	...	...	...	...	...	...

Table 19b

Summary of Portfolio Compositions of Power Policies Managing 24 Value-Weighted Industries, With Leverage, 1934-86 (32 quarter estimating period, simple probability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Banks & Fin. Serv.	...	...	...	...	...	...	...	...	...	...
Chemicals, R. & P.	19	24	26	27	26	23	21	21	15	1
Construction	3	4	6	7	7	8	10	14	13	9
Fabricated M.P.	2	2	2	2	2	2	1	...	...	...
Food	5	5	5	5	5	5	5	1	...	...
Insurance	41	41	43	45	44	40	27	11	13	4
Machinery	9	12	13	15	15	16	14	13	12	10
Metals	...	...	...	...	...	...	...	1	1	...
Mining	5	9	11	12	13	13	12	2	...	...
Oil & Gas Expl.	87	90	93	97	98	99	99	81	62	38
Paper & Wood	5	6	6	8	10	19	21	14	11	2
Petroleum & Coal	40	47	50	54	53	48	27	5	...	...
Railroads & Truck.	2	2	2	2	2	2	1	...	...	...
Real Estate	44	49	51	52	54	56	55	50	32	23
Retail Tr., Food	67	68	68	68	67	62	51	12	7	6
Retail Tr., Others	13	16	17	17	18	17	10	4	2	1
Services, Leisure	20	28	33	43	45	47	51	50	50	47
Services, Others	51	52	52	54	52	51	52	51	48	40
Textile	8	9	9	10	10	10	8	7	...	...
Tobacco	93	97	101	101	97	93	90	74	49	21
Transportation	26	27	27	28	28	28	29	26	21	14
Transportation Eq.	29	30	30	27	28	28	26	21	25	19
Utilities	39	38	37	21	17	16	14	5	1	1
Wholesale Tr.	4	6	6	8	8	9	6	4	2	8
Lending	204	200	188	181	176	140	87	8	...	...
Borrowing	...	1	15	31	31	51	109	173	201	206
Neither	8	11	9	...	5	21	16	31	11	6
Max. Lent (%)	100	99	98	97	95	91	82	42	...	...
Min. Lent(%)	4	1	3	23	6	1	5	2	...	...
Loss Quarters	32	36	41	52	58	69	74	86	92	87
In 0 Industries	1	...	...	...	...	...	...	...	...	...
In 1 Industry	45	34	19	13	12	9	10	45	95	184
In 2 Industries	61	57	64	54	53	59	72	96	86	25
In 3 Industries	42	45	48	58	57	57	67	59	27	2
In 4 Industries	21	31	37	44	53	51	47	7	4	1
In 5 Industries	22	20	21	28	27	28	10	5	...	...
In 6 Industries	16	21	18	13	7	6	5	...	...	...
In 7 Industries	3	3	4	2	3	2	1	...	...	...
In 8 Industries	1	1	1	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
....	...	...	...	...	...	...	...	...	...	...
....	...	...	...	...	...	...	...	...	...	...
In 24 Industries	...	...	...	...	...	...	...	...	...	...

Table 20a

Summary of Portfolio Compositions of Power Policies Managing 12 Equal-Weighted Industries, With Leverage, 1936-86
(28 quarter estimating period, simple probability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	95	100	103	105	106	109	105	93	72	50
Finance & R.E.	9	9	9	10	10	14	17	13	8	7
Consumer Durables	1	1	3	5	5	7	7	7	8	6
Basic Industries	17	19	22	25	25	25	26	24	22	1
Food & Tobacco	27	28	29	31	31	31	25	15	9	1
Construction	6	6	6	8	9	12	12	6	8	18
Capital Goods	8	10	12	13	13	13	10	7	6	1
Transportation	13	19	22	24	26	26	33	43	44	45
Utilities	66	67	70	73	73	69	35	9	7	3
Textiles & Trade	6	6	6	7	8	8	11	8	7	6
Services	71	75	79	81	78	76	74	82	73	47
Leisure	35	37	39	37	38	39	40	40	31	21
Lending	204	204	193	177	171	150	82	16	5	1
Borrowing	...	...	...	26	30	42	111	168	187	195
Neither	...	...	11	1	3	12	11	20	12	8
Max. Lent (%)	100	100	100	100	100	100	100	100	100	100
Min. Lent(%)	49	23	1	14	7	2	1	3	38	100
Loss Quarters	22	25	32	44	52	59	65	76	77	79
In 0 Industries	8	5	3	1	1	1	1	1	1	1
In 1 Industry	84	75	59	57	55	56	67	85	124	200
In 2 Industries	69	74	89	81	82	74	84	95	66	3
In 3 Industries	40	46	49	60	61	67	48	20	13	...
In 4 Industries	3	4	4	5	5	6	4	3	...	...
In 5 Industries	...	...	...	...	...	...	...	...	...	...
In 6 Industries	...	...	...	...	...	...	...	...	...	...
In 7 Industries	...	...	...	...	...	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 20b

Summary of Portfolio Compositions of Power Policies Managing 12 Value-Weighted Industries, With Leverage, 1934-86
(28 quarter estimating period, simple probability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	83	90	94	97	99	98	95	56	47	36
Finance & R.E.	11	12	12	16	17	17	12	4	2	2
Consumer Durables	6	12	14	21	25	30	29	23	25	19
Basic Industries	28	32	33	33	32	29	22	15	10	1
Food & Tobacco	33	36	36	36	32	25	23	13	8	6
Construction	10	10	10	10	10	11	11	13	16	14
Capital Goods	44	45	46	47	47	44	41	42	37	34
Transportation	17	19	20	20	21	21	21	15	13	7
Utilities	62	62	63	61	53	37	24	13	13	9
Textiles & Trade	33	34	34	35	35	34	28	15	12	9
Services	77	81	83	84	86	84	79	76	67	64
Leisure	16	17	19	23	23	26	25	25	19	15
Lending	204	202	183	171	169	139	82	26	12	3
Borrowing	...	...	3	29	31	49	106	155	175	190
Neither	...	2	18	4	4	16	16	23	17	11
Max. Lent (%)	100	100	100	100	100	100	100	100	100	100
Min. Lent(%)	8	3	1	21	2	3	3	2	3	100
Loss Quarters	24	25	32	46	51	59	67	74	74	73
In 0 Industries	12	7	6	4	4	4	3	3	3	3
In 1 Industry	69	61	56	55	53	51	60	112	145	186
In 2 Industries	57	63	65	62	63	74	84	71	46	15
In 3 Industries	32	36	39	45	48	51	48	16	8	...
In 4 Industries	29	31	30	24	24	17	7	2	2	...
In 5 Industries	5	5	7	11	11	6	2	...	...	...
In 6 Industries	...	1	1	3	1	1	...	...	...	...
In 7 Industries	...	...	...	...	...	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 21a

Summary of Portfolio Compositions of Power Policies Managing 12 Equal-Weighted Industries, With Leverage, 1936-86
(40 quarter estimating period, simple probability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	109	111	114	114	114	112	109	97	74	59
Finance & R.E.	20	20	20	21	21	24	28	19	15	6
Consumer Durables	1	1	1	1	1	3	6	6	9	16
Basic Industries	23	27	30	31	33	32	32	34	32	6
Food & Tobacco	42	45	47	51	51	51	46	12	2	...
Construction	3	3	4	5	5	8	6	5	6	17
Capital Goods	7	10	10	11	11	11	11	8	4	...
Transportation	7	8	10	10	10	11	15	39	42	40
Utilities	73	73	73	73	73	73	59	15	6	3
Textiles & Trade	12	12	12	13	13	13	11	5	1	7
Services	60	65	68	74	77	77	79	70	62	36
Leisure	21	21	21	22	22	24	29	38	30	24
Lending	204	204	201	189	183	144	98	25	1	...
Borrowing	...	...	...	13	17	43	94	152	188	197
Neither	...	...	3	2	4	17	12	27	15	7
Max. Lent (%)	100	100	100	99	99	97	95	84	69	...
Min. Lent(%)	57	36	2	4	3	2	1	1	69	...
Loss Quarters	17	22	32	48	52	57	70	79	77	81
In 0 Industries	3	1	1	...	...	...	...	...	...	...
In 1 Industry	84	74	67	62	57	55	57	100	136	194
In 2 Industries	67	76	76	74	80	80	79	70	57	10
In 3 Industries	42	44	51	58	57	57	57	28	11	...
In 4 Industries	6	7	7	8	7	7	10	6	...	...
In 5 Industries	2	2	2	2	3	5	1	...	...	...
In 6 Industries	...	...	...	...	...	...	...	...	...	...
In 7 Industries	...	...	...	...	...	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 21b

Summary of Portfolio Compositions of Power Policies Managing 12 Value-Weighted Industries, With Leverage, 1936-86
(40 quarter estimating period, simple probability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	108	111	117	121	124	123	117	81	54	34
Finance & R.E.	4	4	5	5	9	19	13	6	...	...
Consumer Durables	18	25	31	41	42	46	45	43	37	25
Basic Industries	26	29	32	33	29	24	20	10	7	...
Food & Tobacco	23	25	29	26	28	28	24	11	3	...
Construction	1	5	6	7	8	8	9	14	16	22
Capital Goods	53	57	58	60	62	69	70	64	55	43
Transportation	1	2	3	3	3	3	3	4	2	...
Utilities	66	68	70	70	70	46	32	6	3	4
Textiles & Trade	34	38	41	42	42	43	43	16	11	5
Services	71	74	77	79	80	85	83	72	63	60
Leisure	11	15	16	19	19	19	23	25	26	24
Lending	204	204	195	185	181	139	101	46	18	2
Borrowing	...	...	...	16	18	40	83	138	159	185
Neither	...	...	9	3	5	25	20	20	27	17
Max. Lent (%)	100	100	100	100	100	100	100	100	100	100
Min. Lent(%)	45	19	1	2	14	1	1	7	1	100
Loss Quarters	17	23	32	39	45	58	66	71	71	74
In 0 Industries	22	10	7	5	3	3	3	3	3	2
In 1 Industry	53	53	43	38	37	33	31	92	139	187
In 2 Industries	61	63	65	63	64	64	86	76	51	15
In 3 Industries	39	47	53	62	64	71	60	25	8	...
In 4 Industries	21	23	28	27	27	27	21	7	3	...
In 5 Industries	8	7	7	6	5	5	3	1	...	...
In 6 Industries	...	1	1	3	2	1	...	...	...	...
In 7 Industries	...	...	...	...	2	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 22a

Summary of Portfolio Compositions of Power Policies Managing 12 Equal-Weighted Industries, With Leverage, 1934-86
(32 quarter estimating period, inflation adapter approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	89	91	97	97	98	96	96	82	68	58
Finance & R.E.	9	9	9	9	11	13	20	11	4	1
Consumer Durables	2	2	2	2	2	2	2	2	4	5
Basic Industries	19	25	26	27	27	27	27	27	31	5
Food & Tobacco	36	40	42	43	43	43	35	13	8	...
Construction	6	6	6	7	7	8	7	3	10	24
Capital Goods	9	9	9	9	9	10	9	9	6	3
Transportation	7	10	12	12	13	14	20	28	30	30
Utilities	71	72	73	73	73	67	42	25	14	10
Textiles & Trade	4	4	4	4	5	5	8	7	6	14
Services	66	70	74	78	77	74	74	63	56	38
Leisure	22	26	27	30	31	30	35	34	26	20
Lending	212	212	209	191	181	166	99	44	19	14
Borrowing	...	...	...	16	20	37	103	149	183	189
Neither	...	...	3	5	11	9	10	19	10	9
Max. Lent (%)	100	100	100	100	100	100	100	100	100	100
Min. Lent(%)	52	28	2	20	12	3	7	1	42	100
Loss Quarters	21	26	31	37	42	55	65	74	75	79
In 0 Industries	22	18	15	14	14	14	14	14	14	14
In 1 Industry	79	68	64	59	58	64	72	105	137	188
In 2 Industries	73	83	83	88	87	82	82	81	58	10
In 3 Industries	37	42	49	48	48	47	37	11	2	...
In 4 Industries	1	1	1	3	5	5	7	1	1	...
In 5 Industries	...	...	...	...	...	...	...	...	...	...
In 6 Industries	...	...	...	...	...	...	...	...	...	...
In 7 Industries	...	...	...	...	...	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 22b

Summary of Portfolio Compositions of Power Policies Managing 12 Value-Weighted Industries, With Leverage, 1934-86
(32 quarter estimating period, inflation adapter approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	73	80	83	83	87	87	86	59	48	39
Finance & R.E.	9	10	10	10	11	13	11	2	1	1
Consumer Durables	15	19	23	26	28	31	31	32	33	23
Basic Industries	28	28	30	30	30	27	18	10	6	...
Food & Tobacco	35	36	38	38	38	34	34	23	19	5
Construction	8	11	13	14	15	15	14	16	20	18
Capital Goods	34	36	38	41	41	38	37	40	31	27
Transportation	4	4	6	7	7	7	7	1	...	...
Utilities	56	58	59	61	58	40	21	10	6	9
Textiles & Trade	21	22	24	24	24	23	20	14	11	8
Services	72	75	78	79	80	74	72	61	57	53
Leisure	20	21	22	23	23	25	27	30	22	17
Lending	212	212	201	185	178	157	103	56	34	21
Borrowing	...	...	...	18	27	41	93	144	163	180
Neither	...	...	11	9	7	14	16	12	15	11
Max. Lent (%)	100	100	100	100	100	100	100	100	100	100
Min. Lent(%)	36	4	10	4	9	1	1	1	1	100
Loss Quarters	24	28	36	47	54	59	63	69	68	67
In 0 Industries	33	25	22	22	22	21	21	21	21	21
In 1 Industry	72	72	67	65	62	63	66	104	139	182
In 2 Industries	51	54	53	52	54	56	75	68	42	9
In 3 Industries	32	34	39	37	40	52	38	18	9	...
In 4 Industries	16	18	22	27	23	17	12	1	1	...
In 5 Industries	7	8	8	7	7	3	...	...	...	...
In 6 Industries	1	1	1	1	3	...	...	...	...	...
In 7 Industries	...	...	...	1	1	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 23a

Summary of Portfolio Compositions of Power Policies Managing 12 Equal-Weighted Industries, With Leverage, 1934-86
(32 quarter estimating period, sum-of-the-digits probability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	94	99	104	105	106	105	102	89	73	49
Finance & R.E.	16	16	17	19	21	22	19	20	12	3
Consumer Durables	1	1	1	2	2	2	2	7	12	17
Basic Industries	15	21	24	29	30	31	31	38	35	7
Food & Tobacco	43	45	47	46	46	44	38	23	14	4
Construction	4	7	7	15	19	21	14	6	9	20
Capital Goods	7	9	10	10	13	13	13	6	2	...
Transportation	26	28	29	29	29	30	33	34	34	34
Utilities	72	72	72	73	73	63	41	15	7	6
Textiles & Trade	3	4	4	5	6	7	5	8	10	7
Services	60	68	72	72	72	68	68	67	60	44
Leisure	39	40	43	39	37	37	37	40	35	28
Lending	212	212	205	181	177	152	86	23	4	3
Borrowing	...	...	...	26	32	51	111	173	199	204
Neither	...	...	7	5	3	9	15	16	9	5
Max. Lent (%)	100	100	100	100	100	100	100	100	100	100
Min. Lent(%)	55	33	1	17	8	1	6	1	84	100
Loss Quarters	26	31	36	51	57	68	77	81	82	86
In 0 Industries	6	4	4	4	3	3	3	3	3	3
In 1 Industry	84	68	61	56	56	56	72	97	132	199
In 2 Industries	75	85	84	86	83	92	89	82	62	10
In 3 Industries	42	48	51	50	52	44	39	28	13	...
In 4 Industries	5	7	12	14	14	14	9	2	2	...
In 5 Industries	...	...	...	2	4	3	...	...	...	...
In 6 Industries	...	...	...	...	...	...	...	...	...	...
In 7 Industries	...	...	...	...	...	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 23b

Summary of Portfolio Compositions of Power Policies Managing 12 Value-Weighted Industries, With Leverage, 1934-86 (32 quarter estimating period, sum-of-the-digits probability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	97	101	105	110	110	110	101	65	53	36
Finance & R.E.	11	11	12	12	14	15	16	6	4	...
Consumer Durables	10	13	19	27	30	34	32	34	31	20
Basic Industries	21	24	27	27	25	22	18	13	8	2
Food & Tobacco	46	48	48	48	50	45	35	26	15	6
Construction	7	11	14	14	16	16	17	17	18	23
Capital Goods	40	41	42	44	45	48	45	38	30	19
Transportation	18	19	19	20	21	21	20	13	11	8
Utilities	62	65	65	60	51	36	30	22	23	13
Textiles & Trade	23	28	29	30	30	29	24	17	15	9
Services	82	88	94	97	97	94	90	81	75	67
Leisure	22	23	26	27	29	31	32	30	29	29
Lending	212	212	191	180	172	147	85	29	11	4
Borrowing	...	...	...	31	34	55	108	160	182	200
Neither	...	...	21	1	6	10	19	23	19	8
Max. Lent (%)	100	100	100	100	100	100	100	100	100	100
Min. Lent(%)	46	19	3	4	7	2	2	2	1	100
Loss Quarters	29	32	40	49	58	65	72	73	72	77
In 0 Industries	12	8	5	5	5	4	4	4	4	4
In 1 Industry	57	46	38	31	29	31	39	88	130	184
In 2 Industries	77	84	88	89	90	93	103	91	55	24
In 3 Industries	38	41	42	50	52	55	51	24	20	...
In 4 Industries	26	30	36	29	29	26	13	5	3	...
In 5 Industries	2	3	2	7	5	3	2	...	...	...
In 6 Industries	...	...	1	1	2	...	...	...	...	...
In 7 Industries	...	...	...	...	...	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 24a

Summary of Portfolio Compositions of Power Policies Managing 12 Equal-Weighted Industries, With Leverage, 1934-86 (all-of-history simpleprobability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	124	143	150	153	155	156	156	150	89	9
Finance & R.E.	...	...	...	...	...	...	...	...	...	...
Consumer Durables	...	...	...	...	...	1	2	4	9	208
Basic Industries	34	46	63	80	87	105	115	202	201	...
Food & Tobacco	87	96	102	111	112	113	111	37	7	...
Construction	...	...	...	...	...	...	...	...	...	5
Capital Goods	...	2	2	3	3	3	2	...	...	...
Transportation	...	...	...	...	...	...	...	...	1	...
Utilities	...	...	...	...	...	...	...	...	...	...
Textiles & Trade	...	...	...	...	...	...	...	...	...	...
Services	101	138	157	172	175	180	181	173	148	...
Leisure	...	...	...	...	...	...	...	...	...	...
Lending	212	212	212	212	212	212	212	51	5	...
Borrowing	...	...	...	...	...	...	...	118	196	205
Neither	...	...	...	...	...	...	...	43	11	7
Max. Lent (%)	100	99	99	98	97	94	89	65	28	...
Min. Lent(%)	97	96	94	88	82	68	35	2	5	...
Loss Quarters	15	17	18	25	31	50	64	80	82	83
In 0 Industries	6	...	...	...	...	...	...	...	...	...
In 1 Industry	93	65	41	25	23	18	17	20	41	200
In 2 Industries	86	82	82	71	65	57	53	45	105	10
In 3 Industries	27	64	87	112	117	122	124	132	60	2
In 4 Industries	...	1	2	4	7	15	18	15	6	...
In 5 Industries	...	...	...	...	...	...	...	...	...	...
In 6 Industries	...	...	...	...	...	...	...	...	...	...
In 7 Industries	...	...	...	...	...	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 24b

Summary of Portfolio Compositions of Power Policies Managing 12 Value-Weighted Industries, With Leverage, 1934-86
(all-of-history simpleprobability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	80	94	122	131	131	133	136	102	59	9
Finance & R.E.	...	...	...	...	...	...	...	...	...	...
Consumer Durables	18	52	79	100	108	120	133	165	191	208
Basic Industries	18	23	29	35	38	39	38	32	11	...
Food & Tobacco	74	82	93	97	98	98	98	47	13	...
Construction	...	...	...	...	...	...	...	...	...	5
Capital Goods	69	78	86	92	92	93	91	92	65	...
Transportation	...	...	...	...	...	...	...	...	...	...
Utilities	...	1	4	5	7	8	7	5	...	...
Textiles & Trade	...	...	...	...	...	...	...	...	...	...
Services	...	4	55	128	137	141	142	136	77	...
Leisure	...	...	...	...	...	...	...	...	1	...
Lending	212	212	212	212	212	212	212	70	13	4
Borrowing	...	...	...	...	...	...	...	87	174	199
Neither	...	...	...	...	...	...	...	55	25	9
Max. Lent (%)	100	100	100	100	100	100	100	100	100	100
Min. Lent(%)	97	95	92	85	78	59	19	1	4	100
Loss Quarters	15	16	19	27	33	47	58	67	74	77
In 0 Industries	22	9	7	6	5	5	4	4	4	4
In 1 Industry	125	93	47	26	23	22	18	18	67	194
In 2 Industries	61	91	86	54	52	45	46	61	82	14
In 3 Industries	4	17	43	63	60	61	61	81	51	...
In 4 Industries	...	2	25	51	58	60	64	44	7	...
In 5 Industries	...	...	4	11	12	17	18	4	1	...
In 6 Industries	...	...	...	1	2	2	1	...	...	...
In 7 Industries	...	...	...	...	...	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 25a

Summary of Portfolio Compositions of Power Policies Managing 12 Equal-Weighted Industries, With Leverage, 1934-86 (32 quarter estimating period, disaster state scenarioJ - 1, simpleprobability assessment approach)

Number of Times in:	-75	-50	-30	-15	-10	-5	-2	0	.5	1
	Powers									
Petroleum	96	101	102	103	104	103	105	101	90	70
Finance & R.E.	9	9	9	9	11	12	14	13	9	2
Consumer Durables	...	...	...	...	...	1	2	3	5	6
Basic Industries	26	30	30	31	32	32	33	33	33	5
Food & Tobacco	17	18	20	20	20	21	18	8	4	1
Construction	6	7	8	8	8	8	9	3	9	23
Capital Goods	8	8	9	9	9	9	9	7	6	3
Transportation	11	15	18	21	22	22	26	35	34	38
Utilities	61	62	63	64	64	62	38	14	11	4
Textiles & Trade	6	8	8	8	8	9	9	5	4	10
Services	62	65	68	74	74	72	71	72	63	50
Leisure	20	22	22	23	22	24	24	21	15	7
Lending	212	212	208	189	185	178	111	48	8	...
Borrowing	...	...	...	21	23	32	80	141	186	200
Neither	...	...	4	2	4	2	21	23	18	12
Max. Lent (%)	100	100	99	99	98	97	93	80	60	...
Min. Lent(%)	54	31	2	28	5	8	2	1	1	...
Loss Quarters	21	26	30	39	46	59	69	79	80	83
In 0 Industries	6	1	...	...	...	...	...	...	...	...
In 1 Industry	123	115	109	101	100	99	108	129	151	205
In 2 Industries	51	59	62	66	66	67	66	63	51	7
In 3 Industries	31	36	40	43	42	42	34	20	10	...
In 4 Industries	1	1	1	2	4	4	4	...	...	...
In 5 Industries	...	...	...	...	...	...	...	...	...	...
In 6 Industries	...	...	...	...	...	...	...	...	...	...
In 7 Industries	...	...	...	...	...	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 25b

Summary of Portfolio Compositions of Power Policies Managing 12 Value-Weighted Industries, With Leverage, 1934-86 (32 quarter estimating period, disaster state scenarioJ = 1, simpleprobability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	75	81	86	90	89	90	90	64	53	40
Finance & R.E.	5	5	5	6	6	8	5	1	...	...
Consumer Durables	13	18	20	27	31	31	29	30	30	24
Basic Industries	20	20	20	22	23	17	12	9	9	1
Food & Tobacco	21	24	23	23	22	18	13	7	6	3
Construction	6	10	15	16	17	18	17	18	19	20
Capital Goods	37	40	43	46	46	42	41	41	41	35
Transportation	10	11	12	13	13	13	13	10	9	6
Utilities	52	53	55	55	52	31	23	13	12	10
Textiles & Trade	21	21	23	23	24	25	23	12	10	5
Services	68	71	73	75	74	74	72	74	64	57
Leisure	15	19	20	21	22	22	22	22	17	13
Lending	212	212	195	185	181	175	117	63	39	10
Borrowing	...	...	...	23	27	34	71	133	147	183
Neither	...	...	17	4	4	3	24	16	26	19
Max. Lent (%)	100	100	100	100	100	100	100	100	100	100
Min. Lent(%)	45	18	6	2	18	8	1	4	5	100
Loss Quarters	22	29	36	40	48	53	62	75	74	73
In 0 Industries	34	20	11	11	10	10	10	10	10	10
In 1 Industry	91	97	97	86	82	80	84	115	137	190
In 2 Industries	41	46	52	59	64	73	83	76	62	12
In 3 Industries	23	21	23	24	26	34	30	10	3	...
In 4 Industries	17	22	23	23	23	14	5	1	...	...
In 5 Industries	3	3	3	6	4	1	...	...	...	...
In 6 Industries	3	3	3	2	2	...	...	...	...	...
In 7 Industries	...	...	...	1	1	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 26a

Summary of Portfolio Compositions of Power Policies Managing 12 Equal-Weighted Industries, With Leverage, 1934-86
(32 quarter estimating period, disaster state scenarioJ = 6, simpleprobability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	42	47	54	57	56	55	55	54	53	42
Finance & R.E.	6	6	6	6	6	6	8	7	7	7
Consumer Durables	...	...	...	1	1	1	1	1	2	...
Basic Industries	3	4	4	9	12	14	14	14	14	9
Food & Tobacco	6	6	7	8	8	9	9	8	6	4
Construction	4	5	5	16	16	17	17	15	16	23
Capital Goods	...	...	...	...	...	...	...	...	...	...
Transportation	...	4	4	9	11	12	12	15	17	20
Utilities	33	34	34	35	35	35	33	13	8	...
Textiles & Trade	4	4	6	6	7	7	8	8	6	2
Services	37	39	43	46	47	46	47	44	46	40
Leisure	1	2	3	3	3	4	4	4	4	1
Lending	212	212	212	191	189	187	178	146	116	66
Borrowing	...	...	...	13	21	23	32	51	77	127
Neither	...	...	...	8	2	2	2	15	19	19
Max. Lent (%)	100	100	100	100	100	100	100	100	100	100
Min. Lent(%)	61	42	4	1	44	3	17	3	3	100
Loss Quarters	12	12	19	28	33	38	46	51	55	61
In 0 Industries	117	107	98	75	69	67	66	66	66	66
In 1 Industry	62	68	73	89	94	93	95	112	114	144
In 2 Industries	26	29	31	38	40	43	41	31	31	2
In 3 Industries	6	7	9	9	8	9	9	3	1	...
In 4 Industries	1	1	1	1	1	...	1	...	...	...
In 5 Industries	...	...	...	...	...	...	...	...	...	...
In 6 Industries	...	...	...	...	...	...	...	...	...	...
In 7 Industries	...	...	...	...	...	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 26b

Summary of Portfolio Compositions of Power Policies Managing 12 Value-Weighted Industries, With Leverage, 1934-86 (32 quarter estimating period, disaster state scenarioJ - 6, simpleprobability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	30	32	34	39	40	43	41	33	31	16
Finance & R.E.	3	3	3	3	3	4	4	2	...	...
Consumer Durables	9	9	10	12	12	13	13	13	14	13
Basic Industries	12	12	12	13	13	9	8	3	2	...
Food & Tobacco	22	22	22	20	20	17	9	6	5	4
Construction	...	1	1	3	4	4	7	6	7	10
Capital Goods	6	9	10	13	14	15	8	...	...	...
Transportation	...	2	2	2	2	2	2	2	3	2
Utilities	38	38	38	36	32	22	8	6	5	3
Textiles & Trade	1	1	1	1	1	1	1	2	3	1
Services	50	55	55	56	57	58	59	58	56	56
Leisure	4	5	7	9	9	9	9	9	8	7
Lending	212	212	207	189	188	180	176	146	121	101
Borrowing	...	...	...	16	23	23	33	46	75	100
Neither	...	...	5	7	1	9	3	20	16	11
Max. Lent (%)	100	100	100	100	100	100	100	100	100	100
Min. Lent(%)	54	32	1	31	5	27	5	1	9	100
Loss Quarters	11	13	16	20	22	27	33	35	36	40
In 0 Industries	119	111	108	106	106	104	102	101	101	101
In 1 Industry	52	58	60	56	55	55	65	83	89	110
In 2 Industries	11	12	13	19	21	22	33	27	21	1
In 3 Industries	22	20	18	18	16	26	10	1	1	...
In 4 Industries	5	8	9	8	10	5	2	...	...	...
In 5 Industries	3	3	4	3	2	...	...	...	...	...
In 6 Industries	...	...	...	2	2	...	...	...	...	...
In 7 Industries	...	...	...	...	...	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 27a

Summary of Portfolio Compositions of Power Policies Managing 12 Equal-Weighted Industries, With Leverage, 1934-86 (32 quarter estimating period, disaster state scenario J = 12, simpleprobability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	4	4	7	8	8	10	10	9	9	7
Finance & R.E.	6	6	6	6	6	6	6	5	5	5
Consumer Durables	...	...	...	...	...	...	...	...	...	...
Basic Industries	...	...	1	1	1	1	1	2	1	...
Food & Tobacco	...	...	...	...	...	...	...	...	...	1
Construction	5	5	5	6	8	8	8	7	7	9
Capital Goods	...	...	...	...	...	...	...	...	...	...
Transportation	...	...	...	...	...	...	1	1	1	2
Utilities	29	31	31	31	31	31	31	18	16	7
Textiles & Trade	...	...	...	...	...	...	1	1	1	...
Services	24	25	27	28	29	28	28	26	25	25
Leisure	...	...	...	...	...	...	...	...	...	...
Lending	212	212	212	194	190	189	186	178	173	156
Borrowing	...	...	...	7	17	23	23	31	33	44
Neither	...	...	...	11	5	...	3	3	6	12
Max. Lent (%)	100	100	100	100	100	100	100	100	100	100
Min. Lent(%)	64	46	11	13	14	48	5	12	27	100
Loss Quarters	7	8	10	12	13	14	15	19	20	23
In 0 Industries	173	170	164	162	159	158	157	156	156	156
In 1 Industry	14	17	23	24	27	28	28	44	48	56
In 2 Industries	21	21	21	22	22	22	23	11	7	...
In 3 Industries	4	4	4	4	4	4	4	1	1	...
In 4 Industries	...	...	...	...	...	...	...	...	...	...
In 5 Industries	...	...	...	...	...	...	...	...	...	...
In 6 Industries	...	...	...	...	...	...	...	...	...	...
In 7 Industries	...	...	...	...	...	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 27b

Summary of Portfolio Compositions of Power Policies Managing 12 Value-Weighted Industries, With Leverage, 1934-86
(32 quarter estimating period, disaster state scenarioJ - 12, simpleprobability assessment approach)

Number of Times in:	Powers -75	-50	-30	-15	-10	-5	-2	0	.5	1
Petroleum	1	2	2	3	2	3	2	2	2	2
Finance & R.E.	2	3	3	3	3	3	3	2	...	...
Consumer Durables	9	11	12	12	12	13	12	12	10	9
Basic Industries	8	8	8	9	9	8	5	2	1	...
Food & Tobacco	20	20	20	19	19	18	7	3	3	3
Construction	...	...	...	...	1	...	...	...	...	...
Capital Goods	4	4	4	5	4	2	...	...	...	...
Transportation	...	...	...	...	...	...	...	...	...	...
Utilities	34	35	35	28	24	22	9	5	5	4
Textiles & Trade	...	...	...	...	...	...	...	...	...	...
Services	23	25	29	34	34	35	35	34	34	34
Leisure	...	...	...	...	...	...	...	...	...	...
Lending	212	212	212	191	189	185	180	176	175	160
Borrowing	...	...	...	8	21	23	24	32	33	46
Neither	...	...	...	13	2	4	8	4	4	6
Max. Lent (%)	100	100	100	100	100	100	100	100	100	100
Min. Lent(%)	60	40	1	8	39	12	24	25	27	100
Loss Quarters	5	7	7	9	9	13	15	16	16	16
In 0 Industries	175	172	168	161	161	160	160	160	160	160
In 1 Industry	4	7	11	18	18	18	33	44	49	52
In 2 Industries	8	6	6	14	16	19	17	8	3	...
In 3 Industries	20	22	22	13	12	12	2	...	...	...
In 4 Industries	4	2	1	2	3	3	...	...	...	...
In 5 Industries	1	3	4	4	2	...	...	...	...	...
In 6 Industries	...	...	...	...	...	...	...	...	...	...
In 7 Industries	...	...	...	...	...	...	...	...	...	...
In 8 Industries	...	...	...	...	...	...	...	...	...	...
In 9 Industries	...	...	...	...	...	...	...	...	...	...
In 10 Industries	...	...	...	...	...	...	...	...	...	...
In 11 Industries	...	...	...	...	...	...	...	...	...	...
In 12 Industries	...	...	...	...	...	...	...	...	...	...

Table 28

Paired *t*-tests : Selected Active Strategies Managing 12 Equal-Weighted Industry Indices vs. Passive and Semi-Passive Strategies
(32 quarter estimating period, simple probability assessment approach)

Comparison	$\bar{d}$	$\sigma(d)$	t
Panel A : 1934-86, With Leverage			
Power -75 vs. Risk-free asset	.0022	.0107	3.04**
Power -50 vs. Risk-free asset	.0033	.0161	2.97**
Power -30 vs. Risk-free asset	.0054	.0256	3.05**
Power -5 vs. Portfolio V8	.0019	.0519	.54
Power -2 vs. Portfolio V12	.0043	.0720	.86
Power 0 vs. Portfolio V20	.0091	.1022	1.30
Power 0 vs. Services	.0040	.1063	.55
Panel B : 1966-86, With Leverage			
Power -75 vs. Risk-free asset	.0010	.0047	1.99*
Power -50 vs. Risk-free asset	.0015	.0070	1.98*
Power -30 vs. Risk-free asset	.0025	.0115	1.97*
Power -30 vs. Portfolio V2	.0010	.0115	.80
Power -15 vs. Portfolio V2	.0032	.0147	1.99*
Power -10 vs. Portfolio V4	.0040	.0238	1.54
Power -5 vs. Portfolio V8	.0069	.0466	1.36
Power -2 vs. Portfolio V12	.0145	.0714	1.86*
Power -2 vs. Portfolio V14	.0153	.0809	1.73*
Power -2 vs. Portfolio E10	.0033	.0836	.36
Power 0 vs. Portfolio V20	.0263	.1151	2.10*
Power 0 vs. Portfolio E14	.0109	.1101	.91
Power 0 vs. Services	.0104	.1146	.83
Power 5 vs. Portfolio E18	.0026	.1351	.17

Table 28 (continued)

Comparison	$\bar{d}$	σ(d)	t
Panel C : 1966-86, Without Leverage			
Power -75 vs. Risk-free asset	.0010	.0047	1.99*
Power -50 vs. Risk-free asset	.0015	.0070	1.98*
Power -30 vs. Risk-free asset	.0025	.0115	1.97*
Power -30 vs. Portfolio V2	.0010	.0115	.80
Power -15 vs. Portfolio V2	.0032	.0147	1.99*
Power -10 vs. Portfolio V4	.0040	.0238	1.54
Power -5 vs. Portfolio V8	.0069	.0465	1.37
Power -2 vs. Portfolio V10	.0114	.0576	1.81*
Power -2 vs. Portfolio E8	.0033	.0649	.46
Power 0 vs. Petroleum	.0073	.0729	.92
Power 0 vs. Finance & Real Estate	.0059	.0889	.61
Power 0 vs. Construction	.0048	.0898	.49
Power 0 vs. Capital Goods	.0072	.0804	.82
Power 0 vs. Transportation	.0092	.0929	.91
Power .5 vs. Petroleum	.0068	.0749	.83
Power .5 vs. Finance & Real Estate	.0053	.0910	.54
Power .5 vs. Construction	.0042	.0912	.42
Power .5 vs. Capital Goods	.0066	.0802	.76
Power .5 vs. Transportation	.0087	.0939	.84
Power 1 vs. Petroleum	.0058	.0779	.68
Power 1 vs. Finance & Real Estate	.0043	.0923	.43
Power 1 vs. Construction	.0032	.0924	.32
Power 1 vs. Capital Goods	.0056	.0805	.64
Power 1 vs. Transportation	.0077	.0943	.74

* Significant at the 5% level.
** Significant at the 1% level.

Table 29

Paired t-tests : Selected Active Strategies Managing 12 Value-Weighted Industry Indices vs. Passive Strategies
(32 quarter estimating period, simple probability assessment approach)

Comparison	$\bar{d}$	σ(d)	t
Panel A : 1966-86, With Leverage			
Power -75 vs. Risk-free asset	.0007	.0048	1.42
Power -50 vs. Risk-free asset	.0011	.0071	1.41
Power -30 vs. Risk-free asset	.0018	.0116	1.40
Power -15 vs. Portfolio V2	.0019	.0178	.96
Power -10 vs. Portfolio V4	.0020	.0290	.65
Power -5 vs. Portfolio V6	.0032	.0449	.65
Power -5 vs. Utilities	.0016	.0636	.23
Power -2 vs. Portfolio V12	.0058	.0808	.65
Power -2 vs. Finance & Real Estate	.0014	.0886	.15
Power -2 vs. Capital Goods	.0077	.0879	.80
Power -2 vs. Transportation	.0098	.0995	.90
Panel B : 1966-86, Without Leverage			
Power -75 vs. Risk-free asset	.0007	.0048	1.42
Power -50 vs. Risk-free asset	.0011	.0071	1.41
Power -30 vs. Risk-free asset	.0018	.0116	1.40
Power -15 vs. Portfolio V2	.0019	.0178	.96
Power -10 vs. Portfolio V4	.0020	.0290	.65
Power -5 vs. Portfolio V6	.0029	.0424	.63
Power -5 vs. Portfolio V8	.0023	.0522	.41
Power -2 vs. Portfolio V10	.0028	.0625	.41
Power -2 vs. Basic Industries	.0046	.0708	.60

* Significant at the 5% level.
** Significant at the 1% level.

Table 30a

Paired t-tests : 12 vs. 8 Industry Universe, Equal-Weighted
(32 quarter estimating period, simple probability assessment approach)

Strategy	1934 - 1986 $\bar{d}$	1934 - 1986 $\sigma(d)$	1934 - 1986 t	1966 - 1986 $\bar{d}$	1966 - 1986 $\sigma(d)$	1966 - 1986 t
Panel A : With Leverage						
Power -75	.0003	.0042	1.15	.0001	.0012	.57
Power -50	.0005	.0063	1.09	.0001	.0018	.56
Power -30	.0008	.0094	1.23	.0002	.0030	.55
Power -15	.0004	.0120	.52	.0003	.0057	.53
Power -10	.0006	.0123	.70	.0005	.0083	.51
Power -5	.0002	.0170	.20	.0006	.0144	.36
Power -2	.0006	.0279	.30	.0017	.0272	.58
Power 0	.0029	.0519	.81	.0015	.0460	.30
Power .5	.0046	.0681	.98	.0050	.0536	.85
Power 1	.0062	.0793	1.13	.0035	.0654	.49
Panel B : Without Leverage						
Power -75	.0003	.0042	1.15	.0001	.0012	.57
Power -50	.0005	.0063	1.09	.0001	.0018	.56
Power -30	.0008	.0094	1.23	.0002	.0030	.55
Power -15	.0001	.0084	.20	.0003	.0057	.53
Power -10	.0002	.0102	.23	.0005	.0083	.51
Power -5	.0002	.0160	.16	.0006	.0141	.41
Power -2	.0010	.0228	.64	.0010	.0194	.49
Power 0	.0017	.0368	.66	.0018	.0314	.60
Power .5	.0005	.0374	.21	.0025	.0323	.70
Power 1	.0003	.0405	.10	.0023	.0363	.59

Table 30b

Paired t-tests : 12 vs. 8 Industry Universe, Value-Weighted
(32 quarter estimating period, simple probability assessment approach)

Strategy	1934 - 1986 $\bar{d}$	1934 - 1986 $\sigma(d)$	1934 - 1986 t	1966 - 1986 $\bar{d}$	1966 - 1986 $\sigma(d)$	1966 - 1986 t
Panel A : With Leverage						
Power -75	.0008	.0049	2.33*	.0004	.0023	1.52
Power -50	.0012	.0073	2.32*	.0006	.0034	1.51
Power -30	.0012	.0091	1.89*	.0009	.0056	1.50
Power -15	.0012	.0141	1.24	.0017	.0107	1.46
Power -10	.0005	.0170	.41	.0024	.0154	1.43
Power -5	.0001	.0257	.03	.0032	.0232	1.26
Power -2	.0015	.0396	.57	.0058	.0402	1.32
Power 0	.0047	.0710	.96	.0058	.0686	.78
Power .5	.0068	.0980	1.00	.0030	.0879	.31
Power 1	.0068	.1373	.72	.0128	.1236	.95
Panel B : Without Leverage						
Power -75	.0008	.0049	2.33*	.0004	.0023	1.52
Power -50	.0012	.0073	2.32*	.0006	.0034	1.51
Power -30	.0012	.0091	1.89*	.0009	.0056	1.50
Power -15	.0002	.0119	.24	.0017	.0107	1.46
Power -10	.0002	.0162	.21	.0024	.0154	1.43
Power -5	.0009	.0217	.58	.0030	.0193	1.43
Power -2	.0013	.0334	.57	.0043	.0292	1.34
Power 0	.0045	.0566	1.16	.0047	.0495	.87
Power .5	.0044	.0648	.99	.0004	.0594	.68
Power 1	.0030	.0729	.60	-.0062	.0743	-.77

* Significant at the 5% level.

Table 31a

Paired t-tests : 12 vs. 24 Industry Universe, Equal-Weighted
(32 quarter estimating period, simple probability assessment approach)

Strategy	1934 - 1986 $\bar{d}$	1934 - 1986 $\sigma(d)$	1934 - 1986 t	1966 - 1986 $\bar{d}$	1966 - 1986 $\sigma(d)$	1966 - 1986 t
Panel A : With Leverage						
Power -75	-.0007	.0060	-1.75*	-.0007	.0040	-1.51
Power -50	-.0010	.0086	-1.66*	-.0010	.0059	-1.50
Power -30	-.0011	.0093	-1.69	-.0016	.0097	-1.48
Power -15	-.0014	.0162	-1.30	-.0029	.0186	-1.44
Power -10	-.0013	.0221	-.84	-.0041	.0269	-1.40
Power -5	-.0017	.0350	-.71	-.0047	.0454	-.96
Power -2	-.0031	.0546	-.82	-.0046	.0716	-.59
Power 0	.0047	.0846	.80	.0194	.0894	1.99*
Power .5	.0110	.1312	1.22	.0293	.1206	2.23*
Power 1	.0165	.1800	1.33	.0527	.1709	2.82**
Panel B : Without Leverage						
Power -75	-.0007	.0060	-1.75*	-.0007	.0040	-1.51
Power -50	-.0010	.0086	-1.66*	-.0010	.0059	-1.50
Power -30	-.0010	.0090	-1.66*	-.0016	.0097	-1.48
Power -15	-.0010	.0153	-.91	-.0029	.0186	-1.44
Power -10	-.0012	.0209	-.81	-.0041	.0269	-1.40
Power -5	-.0013	.0296	-.64	-.0027	.0381	-.64
Power -2	.0004	.0432	.13	.0034	.0533	.58
Power 0	.0027	.0623	.64	.0131	.0630	1.90*
Power .5	.0052	.0823	.93	.0215	.0718	2.75**
Power 1	.0046	.1001	.67	.0273	.0930	2.69**

* Significant at the 5% level.
** Significant at the 1% level.

Table 31b

Paired t-tests : 12 vs. 24 Industry Universe, Value-Weighted
(32 quarter estimating period, simple probability assessment approach)

Strategy	1934 - 1986 $\bar{d}$	1934 - 1986 $\sigma(d)$	1934 - 1986 t	1966 - 1986 $\bar{d}$	1966 - 1986 $\sigma(d)$	1966 - 1986 t
Panel A : With Leverage						
Power -75	-.0011	.0116	-1.44	.0001	.0035	.26
Power -50	-.0006	.0113	-.82	.0002	.0052	.27
Power -30	-.0001	.0152	-.11	.0003	.0086	.29
Power -15	-.0000	.0230	-.01	.0006	.0167	.34
Power -10	-.0003	.0267	-.19	.0011	.0243	.40
Power -5	.0005	.0373	.21	.0025	.0420	.54
Power -2	.0038	.0568	.97	.0080	.0708	1.04
Power 0	.0138	.0978	2.06*	.0170	.1179	1.33
Power .5	.0164	.1282	1.86*	.0236	.1547	1.40
Power 1	.0204	.1613	1.84*	.0298	.1904	1.43
Panel B : Without Leverage						
Power -75	-.0011	.0116	-1.44	.0001	.0035	.26
Power -50	-.0003	.0113	-.83	.0002	.0052	.27
Power -30	.0003	.0145	.34	.0003	.0086	.29
Power -15	.0001	.0187	.07	.0006	.0167	.34
Power -10	.0003	.0238	.19	.0011	.0243	.40
Power -5	.0007	.0327	.32	.0026	.0392	.61
Power -2	.0037	.0483	1.11	.0064	.0604	.97
Power 0	.0064	.0723	1.28	.0094	.0926	.93
Power .5	.0051	.0723	1.02	.0075	.0890	.77
Power 1	.0069	.0781	1.29	.0054	.0905	.55

* Significant at the 5% level.

Table 32a

Paired t-tests : 32 vs. 28 Quarter Estimating Period,
- 12 Equal-Weighted Industry Indices
(simple probability assessment approach)

Strategy	1936 - 1986 $\bar{d}$	$\sigma(d)$	t	1966 - 1986 $\bar{d}$	$\sigma(d)$	t
Panel A : With Leverage						
Power -75	-.0006	.0030	-2.93**	.0001	.0019	.72
Power -50	-.0009	.0044	-2.92**	.0002	.0028	.73
Power -30	-.0011	.0064	-2.48**	.0004	.0046	.75
Power -15	-.0018	.0111	-2.33*	.0008	.0090	.80
Power -10	-.0016	.0140	-1.62	.0012	.0132	.85
Power -5	-.0023	.0224	-1.44	.0018	.0232	.71
Power -2	-.0026	.0343	-1.10	.0031	.0376	.76
Power 0	.0047	.0638	1.06	.0097	.0560	1.59
Power .5	.0044	.0739	.86	.0019	.0590	.29
Power 1	-.0052	.0850	-.87	-.0016	.0748	-.19
Panel B : Without Leverage						
Power -75	-.0006	.0030	-2.93**	.0001	.0019	.72
Power -50	-.0009	.0044	-2.92**	.0002	.0028	.73
Power -30	-.0011	.0064	-2.48**	.0004	.0046	.75
Power -15	-.0012	.0098	-1.74*	.0008	.0090	.80
Power -10	-.0014	.0135	-1.49	.0012	.0132	.85
Power -5	-.0017	.0204	-1.20	.0015	.0225	.60
Power -2	.0012	.0300	.56	.0046	.0347	1.21
Power 0	.0018	.0410	.63	.0041	.0399	.94
Power .5	.0004	.0451	.14	.0034	.0451	.70
Power 1	-.0039	.0437	-1.27	.0015	.0429	.33

* Significant at the 5% level.
** Significant at the 1% level.

Table 32b

Paired t-tests : 32 vs. 28 Quarter Estimating Period, 12 Value-Weighted Industry Indices (simple probability assessment approach)

Strategy	1936 - 1986 $\bar{d}$	1936 - 1986 $\sigma(d)$	1936 - 1986 t	1966 - 1986 $\bar{d}$	1966 - 1986 $\sigma(d)$	1966 - 1986 t
Panel A : With Leverage						
Power -75	-.0005	.0054	-1.35	.0003	.0018	1.34
Power -50	-.0006	.0061	-1.51	.0004	.0027	1.35
Power -30	-.0009	.0083	-1.52	.0007	.0045	1.37
Power -15	-.0013	.0113	-1.68*	.0013	.0087	1.41
Power -10	-.0014	.0139	-1.48	.0020	.0128	1.45
Power -5	-.0012	.0224	-.76	.0035	.0240	1.33
Power -2	-.0004	.0326	-.19	.0047	.0375	1.15
Power 0	.0015	.0495	.43	.0030	.0489	.56
Power .5	.0021	.0653	.45	.0031	.0609	.46
Power 1	-.0044	.0687	-.92	-.0089	.0931	-.88
Panel B : Without Leverage						
Power -75	-.0005	.0054	-1.35	.0003	.0018	1.34
Power -50	-.0006	.0061	-1.51	.0004	.0027	1.35
Power -30	-.0008	.0066	-1.70*	.0007	.0045	1.37
Power -15	-.0010	.0096	-1.46	.0013	.0087	1.41
Power -10	-.0010	.0129	-1.09	.0020	.0128	1.45
Power -5	.0000	.0203	.01	.0035	.0237	1.34
Power -2	.0013	.0280	.66	.0052	.0329	1.45
Power 0	-.0023	.0314	-1.07	-.0012	.0333	-.34
Power .5	-.0046	.0386	-1.70*	-.0040	.0481	-.76
Power 1	-.0044	.0463	-1.34	-.0075	.0657	-.104

* Significant at the 5% level.

Table 33a

Paired t-tests : 32 vs. 40 Quarter Estimating Period, 12 Equal-Weighted Industry Indices (simple probability assessment approach)

Strategy	1936 - 1986 $\bar{d}$	$\sigma(d)$	t	1966 - 1986 $\bar{d}$	$\sigma(d)$	t
		Panel A : With Leverage				
Power -75	.0004	.0033	1.67*	.0003	.0020	1.28
Power -50	.0006	.0050	1.62	.0004	.0029	1.28
Power -30	.0010	.0077	1.85*	.0007	.0048	1.28
Power -15	.0009	.0117	1.07	.0013	.0092	1.28
Power -10	.0011	.0158	1.01	.0019	.0133	1.28
Power -5	.0009	.0254	.51	.0038	.0238	1.47
Power -2	.0009	.0395	.31	.0058	.0409	1.30
Power 0	.0044	.0663	.95	.0104	.0717	1.33
Power .5	.0045	.0953	.68	.0079	.0982	.73
Power 1	.0010	.0935	.15	.0022	.0908	.22
		Panel B : Without Leverage				
Power -75	.0004	.0033	1.67*	.0003	.0020	1.28
Power -50	.0006	.0050	1.62	.0004	.0029	1.28
Power -30	.0010	.0077	1.85*	.0007	.0048	1.28
Power -15	.0006	.0103	.90	.0013	.0092	1.28
Power -10	.0005	.0142	.49	.0019	.0133	1.28
Power -5	.0004	.0238	.22	.0039	.0237	1.50
Power -2	.0025	.0332	1.07	.0069	.0379	1.67*
Power 0	.0033	.0483	.97	.0042	.0474	.81
Power .5	.0006	.0500	.17	.0007	.0487	.13
Power 1	-.0022	.0518	-.62	-.0027	.0500	-.50

* Significant at the 5% level.

Table 33b

Paired t-tests : 32 vs. 40 Quarter Estimating Period, 12 Value-Weighted Industry Indices (simple probability assessment approach)

Strategy	1936 - 1986 $\bar{d}$	1936 - 1986 $\sigma(d)$	1936 - 1986 t	1966 - 1986 $\bar{d}$	1966 - 1986 $\sigma(d)$	1966 - 1986 t
Panel A : With Leverage						
Power -75	.0006	.0033	2.37**	.0003	.0022	1.11
Power -50	.0008	.0050	2.36**	.0004	.0033	1.10
Power -30	.0010	.0069	1.96*	.0006	.0054	1.09
Power -15	.0009	.0114	1.07	.0012	.0105	1.05
Power -10	.0003	.0157	.26	.0017	.0152	1.02
Power -5	-.0000	.0261	-.01	.0029	.0272	.99
Power -2	.0003	.0394	.12	.0051	.0415	1.13
Power 0	.0017	.0703	.34	.0070	.0700	.91
Power .5	.0015	.0965	.22	.0134	.0789	1.55
Power 1	-.0023	,0986	-.34	-.0020	.1052	-.18
Panel B : Without Leverage						
Power -75	.0006	.0033	2.37**	.0003	.0022	1.11
Power -50	.0008	.0050	2.36**	.0004	.0033	1.10
Power -30	.0010	.0069	1.96*	.0006	.0054	1.09
Power -15	.0003	.0104	.36	.0012	.0105	1.05
Power -10	-.0002	.0150	-.15	.0017	.0152	1.02
Power -5	-.0005	.0246	-.31	.0027	.0264	.92
Power -2	.0009	.0358	.35	.0051	.0380	1.24
Power 0	.0021	.0522	.57	.0052	.0473	1.01
Power .5	.0009	.0556	.24	.0029	.0566	.47
Power 1	-.0020	.0555	-.51	-.0033	.0586	-.52

* Significant at the 5% level.
** Significant at the 1% level.

Table 34a

Paired t-tests : Simple Probability Assessment Approach vs. Inflation Adapter to Simple Probability Assessment Approach, 12 Equal-Weighted Industry Indices (32 quarter estimating period)

Strategy	1934 - 1986 $\bar{d}$	σ(d)	t	1966 - 1986 $\bar{d}$	σ(d)	t
Panel A : With Leverage						
Power -75	-.0000	.0022	-.23	.0000	.0028	.10
Power -50	-.0001	.0033	-.28	.0000	.0042	.10
Power -30	.0001	.0049	.16	.0001	.0069	.10
Power -15	-.0001	.0091	-.22	.0001	.0133	.09
Power -10	-.0002	.0125	-.23	.0002	.0193	.08
Power -5	-.0004	.0225	-.29	.0003	.0348	.09
Power -2	-.0008	.0405	-.30	.0010	.0631	.15
Power 0	.0016	.0735	.32	.0068	.1149	.54
Power .5	.0002	.0824	.04	-.0008	.1292	-.06
Power 1	.0049	.0950	.75	.0062	.1458	.39
Panel B : Without Leverage						
Power -75	-.0000	.0022	-.23	.0000	.0028	.10
Power -50	-.0001	.0033	-.28	.0000	.0042	.10
Power -30	.0001	.0049	.16	.0001	.0069	.10
Power -15	-.0001	.0087	-.12	.0001	.0133	.09
Power -10	-.0002	.0125	-.23	.0002	.0193	.08
Power -5	-.0004	.0223	-.27	.0006	.0343	.15
Power -2	.0003	.0382	.10	.0032	.0594	.49
Power 0	.0009	.0567	.24	.0034	.0883	.35
Power .5	.0019	.0560	.48	.0033	.0879	.35
Power 1	.0013	.0546	.36	.0011	.0853	.12

Table 34b

Paired t-tests : Simple Probability Assessment Approach vs. Inflation Adapter to Simple Probability Assessment Approach, 12 Value-Weighted Industry Indices(32 quarter estimating period)

Strategy	1934 - 1986 $\bar{d}$	$\sigma(d)$	t	1966 - 1986 $\bar{d}$	$\sigma(d)$	t
Panel A : With Leverage						
Power -75	.0001	.0023	.42	-.0001	.0027	-.39
Power -50	.0001	.0034	.41	-.0002	.0041	-.37
Power -30	.0001	.0051	.34	-.0003	.0067	-.35
Power -15	-.0000	.0094	-.03	-.0004	.0131	-.29
Power -10	.0000	.0123	.05	-.0005	.0177	-.24
Power -5	-.0003	.0215	-.22	-.0012	.0329	-.34
Power -2	-.0012	.0291	-.61	-.0029	.0453	-.59
Power 0	-.0019	.0501	-.54	-.0068	.0774	-.81
Power .5	-.0007	.0619	-.16	-.0054	.0964	-.52
Power 1	-.0089	.0952	-1.37	-.0229	.1499	-1.40
Panel B : Without Leverage						
Power -75	.0001	.0023	.42	-.0001	.0027	-.39
Power -50	.0001	.0034	.41	-.0002	.0041	-.37
Power -30	.0001	.0051	.35	-.0003	.0067	-.35
Power -15	-.0000	.0091	-.02	-.0004	.0131	-.29
Power -10	-.0002	.0116	-.19	-.0008	.0167	-.41
Power -5	-.0004	.0169	-.38	-.0012	.0256	-.42
Power -2	-.0003	.0258	-.17	-.0011	.0400	-.25
Power 0	-.0012	.0410	-.43	-.0050	.0631	-.72
Power .5	-.0022	.0497	-.64	-.0064	.0772	-.76
Power 1	-.0059	.0619	-1.39	-.0149	.0973	-1.41

Table 35a

Paired t-tests : Simple Probability Assessment Approach vs. "Sum-of-the-Digits" Probability Assessment Approach, 12 Equal-Weighted Industry Indices(32 quarter estimating period)

Strategy	1934 - 1986 $\bar{d}$	1934 - 1986 $\sigma(d)$	1934 - 1986 t	1966 - 1986 $\bar{d}$	1966 - 1986 $\sigma(d)$	1966 - 1986 t
Panel A : With Leverage						
Power -75	-.0005	.0028	-2.69**	-.0002	.0023	-.79
Power -50	-.0008	.0041	-2.67**	-.0003	.0035	-.78
Power -30	-.0011	.0063	-2.60**	-.0004	.0057	-.75
Power -15	-.0017	.0116	-2.10*	-.0008	.0111	-.69
Power -10	-.0021	.0161	-1.86*	-.0011	.0160	-.62
Power -5	-.0023	.0267	-1.26	-.0006	.0272	-.21
Power -2	-.0028	.0416	-.96	.0009	.0416	.20
Power 0	.0054	.0826	.96	.0118	.0718	1.51
Power .5	.0056	.1006	.81	.0027	.0785	.31
Power 1	.0002	.0947	.02	.0052	.0920	.52
Panel B : Without Leverage						
Power -75	-.0005	.0028	-2.69**	-.0002	.0023	-.79
Power -50	-.0008	.0041	-2.67**	-.0003	.0035	-.78
Power -30	-.0011	.0063	-2.60**	-.0005	.0057	-.75
Power -15	-.0015	.0113	-1.94*	-.0008	.0111	-.69
Power -10	-.0016	.0159	-1.49	-.0011	.0160	-.62
Power -5	-.0022	.0253	-1.29	-.0007	.0257	-.27
Power -2	.0005	.0375	.20	.0046	.0379	1.12
Power 0	.0022	.0598	.53	.0058	.0530	1.00
Power .5	-.0003	.0558	-.06	.0044	.0573	.71
Power 1	-.0012	.0530	-.33	.0031	.0574	.49

* Significant at the 5% level.
** Significant at the 1% level.

Table 35b

Paired *t*-tests : Simple Probability Assessment Approach vs. "Sum-of-the-Digits" Probability Assessment Approach, 12 Value-Weighted Industry Indices(32 quarter estimating period)

	1934 - 1986			1966 - 1986		
Strategy	$\bar{d}$	σ(d)	*t*	$\bar{d}$	σ(d)	*t*
		Panel A : With Leverage				
Power -75	-.0004	.0034	-1.78*	-.0001	.0027	-.36
Power -50	-.0006	.0050	-1.77*	-.0002	.0040	-.35
Power -30	-.0011	.0076	-2.08*	-.0002	.0065	-.31
Power -15	-.0015	.0130	-1.70*	-.0003	.0126	-.23
Power -10	-.0021	.0167	-1.82*	-.0004	.0173	-.21
Power -5	-.0022	.0291	-1.12	.0001	.0320	.03
Power -2	-.0007	.0421	-.24	.0019	.0449	.39
Power 0	.0031	.0713	.64	.0006	.0717	.77
Power .5	.0053	.1015	.75	-.0005	.0875	-.05
Power 1	.0005	.1123	.07	-.0187	.1164	-1.47
		Panel B : Without Leverage				
Power -75	-.0004	.0034	-1.78*	-.0001	.0027	-.36
Power -50	-.0006	.0050	-1.77*	-.0002	.0040	-.35
Power -30	-.0011	.0076	-2.08*	-.0002	.0065	-.31
Power -15	-.0014	.0122	-1.64	-.0003	.0126	-.23
Power -10	-.0018	.0165	-1.55	-.0005	.0171	-.24
Power -5	-.0011	.0249	-.63	.0007	.0249	.25
Power -2	.0006	.0363	.24	.0028	.0416	.61
Power 0	.0001	.0463	.02	-.0037	.0474	-.72
Power .5	-.0037	.0489	-1.12	-.0086	0.611	-1.29
Power 1	-.0038	.0594	-.92	-.0148	.0776	-1.75*

* Significant at the 5% level.

Table 36a

Paired t-tests : Simple Probability Assessment Approach vs. "All-of-History" Probability Assessment Approach, 12 Equal-Weighted Industry Indices(32 quarter estimating period)

Strategy	1934 - 1986 $\bar{d}$	1934 - 1986 $\sigma(d)$	1934 - 1986 t	1966 - 1986 $\bar{d}$	1966 - 1986 $\sigma(d)$	1966 - 1986 t
			Panel A : With Leverage			
Power -75	.0018	.0098	2.62**	.0007	.0035	1.74*
Power -50	.0026	.0148	2.55**	.0010	.0052	1.73*
Power -30	.0042	.0233	2.62**	.0016	.0086	1.72*
Power -15	.0063	.0347	2.66**	.0030	.0165	1.68*
Power -10	.0082	.0395	3.04**	.0043	.0238	1.64
Power -5	.0105	.0515	2.97**	.0067	.0420	1.47
Power -2	.0117	.0688	2.48**	.0095	.0696	1.24
Power 0	.0085	.0757	1.63	.0130	.0895	1.33
Power .5	.0013	.0935	.21	.0063	.0956	.60
Power 1	.0033	.1348	.36	.0053	.1616	.30
			Panel B : Without Leverage			
Power -75	.0018	.0098	2.62**	.0007	.0035	1.74*
Power -50	.0026	.0148	2.55**	.0010	.0052	1.73*
Power -30	.0042	.0233	2.62**	.0016	.0086	1.72*
Power -15	.0062	.0274	3.28**	.0030	.0165	1.68*
Power -10	.0073	.0316	3.38**	.0043	.0238	1.64
Power -5	.0090	.0442	2.97**	.0068	.0418	1.49
Power -2	.0081	.0495	2.38**	.0077	.0550	1.28
Power 0	.0012	.0469	.38	.0058	.0509	1.05
Power .5	.0009	.0551	.23	.0087	.0573	1.40
Power 1	.0027	.0724	.55	.0050	.860	.53

* Significant at the 5% level.
** Significant at the 1% level.

Table 36b

Paired t-tests : Simple Probability Assessment Approach vs. "All-of-History" Probability Assessment Approach, 12 Value-Weighted Industry Indices(32 quarter estimating period)

	1934 - 1986			1966 - 1986		
Strategy	$\bar{d}$	$\sigma(d)$	t	$\bar{d}$	$\sigma(d)$	t
Panel A : With Leverage						
Power -75	.0023	.0115	2.91**	.0006	.0041	1.24
Power -50	.0034	.0171	2.88**	.0008	.0061	1.23
Power -30	.0047	.0251	2.75**	.0013	.0099	1.22
Power -15	.0066	.0366	2.63**	.0024	.0191	1.17
Power -10	.0072	.0441	2.37**	.0034	.0276	1.13
Power -5	.0086	.0553	2.27*	.0044	.0453	.89
Power -2	.0099	.0681	2.13*	.0046	.0728	.58
Power 0	.0077	.0907	1.24	-.0009	.1075	-.08
Power .5	.0018	.1188	.22	.0024	.1162	.19
Power 1	-.0071	.1312	-.79	-.0175	.1519	-1.06
Panel B : Without Leverage						
Power -75	.0023	.0115	2.91**	.0006	.0041	1.24
Power -50	.0034	.0171	2.88**	.0008	.0061	1.23
Power -30	.0047	.0251	2.75**	.0013	.0099	1.22
Power -15	.0056	.0305	2.66**	.0024	.0191	1.17
Power -10	.0063	.0352	2.61**	.0034	.0276	1.13
Power -5	.0077	.0444	2.51**	.0042	.0425	.90
Power -2	.0059	.0491	1.74*	.0030	.0569	.48
Power 0	.0015	.0633	.34	-.0032	.0715	-.42
Power .5	-.0025	.0730	-.49	-.0031	.0831	-.34
Power 1	-.0042	.0720	-.85	-.0116	.0821	-1.30

* Significant at the 5% level.
** Significant at the 1% level.

Table 37a

Paired t-tests : Simple Probability Assessment Approach vs. "Disaster States" Scenario When J = 1, 12 Equal-Weighted Industry Indices(32 quarter estimating period)

Strategy	1934 - 1986 $\bar{d}$	1934 - 1986 $\sigma(d)$	1934 - 1986 t	1966 - 1986 $\bar{d}$	1966 - 1986 $\sigma(d)$	1966 - 1986 t
Panel A : With Leverage						
Power -75	.0003	.0013	3.38**	.0002	.0013	1.14
Power -50	.0004	.0019	3.30**	.0002	.0019	1.13
Power -30	.0007	.0028	3.75**	.0004	.0032	1.11
Power -15	.0013	.0054	3.53**	.0007	.0061	1.05
Power -10	.0016	.0077	3.02**	.0010	.0088	.99
Power -5	.0025	.0135	2.66**	.0011	.0156	.65
Power -2	.0034	.0200	2.46**	.0016	.0251	.59
Power 0	.0027	.0325	1.19	.0007	.0401	.15
Power .5	-.0013	.0467	-.41	-.0075	.0539	-1.27
Power 1	.0007	.0416	.24	.0050	.0514	.88
Panel B : Without Leverage						
Power -75	.0003	.0013	3.38**	.0002	.0013	1.14
Power -50	.0004	.0019	3.30**	.0002	.0019	1.13
Power -30	.0007	.0028	3.75**	.0004	.0032	1.11
Power -15	.0012	.0053	3.26**	.0007	.0061	1.05
Power -10	.0016	.0077	2.99**	.0010	.0088	.99
Power -5	.0024	.0132	2.61**	.0011	.0155	.68
Power -2	.0017	.0162	1.50	.0013	.0214	.55
Power 0	.0007	.0254	.41	-.0004	.0320	-.10
Power .5	-.0010	.0193	-.73	-.0018	.0271	-.60
Power 1	-.0014	.0181	-1.16	-.0001	.0242	-.04

* Significant at the 5% level.
** Significant at the 1% level.

Table 37b

Paired t-tests : Simple Probability Assessment Approach vs. "Disaster States" Scenario When J = 1, 12 Value-Weighted Industry Indices(32 quarter estimating period)

	1934 - 1986			1966 - 1986		
Strategy	$\bar{d}$	σ(d)	t	$\bar{d}$	σ(d)	t
			Panel A : With Leverage			
Power -75	.0003	.0013	3.28**	.0001	.0014	1.00
Power -50	.0004	.0019	3.23**	.0002	.0020	.99
Power -30	.0005	.0029	2.35**	.0003	.0033	.96
Power -15	.0008	.0055	2.25*	.0006	.0063	.90
Power -10	.0011	.0076	2.01*	.0008	.0092	.85
Power -5	.0014	.0127	1.65	.0006	.0160	.36
Power -2	.0018	.0205	1.32	.0001	.0264	.05
Power 0	.0013	.0367	.52	-.0022	.0502	-.40
Power .5	.0006	.0505	.16	.0016	.0620	.23
Power 1	-.0040	.0694	-.84	-.0015	.0982	-1.36
			Panel B : Without Leverage			
Power -75	.0003	.0013	3.28**	.0001	.0014	1.00
Power -50	.0004	.0019	3.23**	.0002	.0020	.99
Power -30	.0005	.0029	2.35**	.0003	.0033	.96
Power -15	.0008	.0051	2.28*	.0006	.0063	.90
Power -10	.0010	.0074	2.04*	.0008	.0092	.85
Power -5	.0014	.0123	1.67*	.0004	.0156	.23
Power -2	.0003	.0178	.20	.0003	.0246	.13
Power 0	.0005	.0301	.23	-.0029	.0421	-.62
Power .5	.0002	.0352	.09	-.0023	.0481	-.44
Power 1	-.0012	.0486	-.37	-.0060	.0715	-.77

* Significant at the 5% level.
** Significant at the 1% level.

Table 38

Summary Results of Jensen's Performance Index Regression

$$r_{pt} - r_{Lt} = \alpha_p + \beta_p (r_{mt} - r_{Lt}) + \epsilon_{pt}$$

When the 10 Active Strategies Manage 12 Equal-Weighted Industries (32 quarter estimating period, simple probability assessment)

	Mean	S.Dev	Min	Max	Number of Positive 5%	Positive 1%	Negative 5%	Negative 1%
Panel A : 1934-86, With Leverage								
R^2	.444	.153	.256	.652				
α (in %)	.661	.417	.098	1.333	10		...	
(t-value)	(1.649)	(.427)	(.704)	(2.127)	5	...	...	...
β	.872	.891	.063	2.724				
(t-value)	(13.462)	(4.256)	(8.509)	(19.841)				
Panel B : 1966-86, With Leverage								
R^2	.589	.045	.554	.667				
α (in %)	1.108	1.000	.071	2.731	10		...	
(t-value)	(2.007)	(.202)	(1.661)	(2.435)	9	1	...	...
β	.779	.775	.041	2.724				
(t-value)	(10.918)	(1.075)	(10.097)	(12.817)				
Panel C : 1934-86, Without Leverage								
R^2	.480	.174	.256	.714				
α (in %)	.393	.202	.098	.743	10		...	
(t-value)	(1.548)	(.606)	(.378)	(2.320)	4	...	...	...
β	.604	.501	.063	1.388				
(t-value)	(14.800)	(5.287)	(8.509)	(22.901)				
Panel D : 1966-86, Without Leverage								
R^2	.601	.059	.554	.691				
α (in %)	.786	.584	.071	1.545	10		...	
(t-value)	(2.000)	(.103)	(1.739)	(2.145)	10	...	...	...
β	.568	.482	.041	1.250				
(t-value)	(11.248)	(1.473)	(10.097)	(13.544)				

Note: t-values in parentheses.

Table 39

Summary Results of Jensen's Performance Index Regression

$$r_{pt} - r_{Lt} = \alpha_p + \beta_p (r_{mt} - r_{Lt}) + \epsilon_{pt}$$

When the 10 Active Strategies Manage 12 Value-Weighted Industries
(32 quarter estimating period, simple probability assessment)

					Number of			
					Positive		Negative	
	Mean	S.Dev	Min	Max	5%	1%	5%	1%
Panel A : 1934-86, With Leverage								
R^2	.378	.157	.186	.626				
α (in %)	.371	.233	-.102	.676	9		1	
(t-value)	(1.214)	(.550)	(-.089)	(1.753)	3	...	...	...
β	.750	.749	.063	2.420				
(t-value)	(11.655)	(4.064)	(6.923)	(18.752)				
Panel B : 1966-86, With Leverage								
R^2	.454	.087	.386	.633				
α (in %)	.177	.514	-1.233	.713	9		1	
(t-value)	(.760)	(.624)	(-.914)	(1.153)	...	...	...	...
β	.637	.638	.035	1.848				
(t-value)	(8.390)	(1.602)	(7.184)	(11.897)				
Panel C : 1934-86, Without Leverage								
R^2	.419	.186	.186	.703				
α (in %)	.168	.243	-.368	.424	8		2	
(t-value)	(.965)	(.861)	(-.721)	(1.753)	3	...	...	...
β	.529	.428	.063	1.286				
(t-value)	(13.044)	(5.323)	(6.923)	(22.318)				
Panel D : 1966-86, Without Leverage								
R^2	.479	.110	.386	.687				
α (in %)	.025	.435	-1.045	.493	7		3	
(t-value)	(.563)	(.854)	(-1.362)	(1.153)	...	...	...	...
β	.477	.414	.035	1.185				
(t-value)	(8.923)	(2.167)	(7.184)	(13.415)				

Note: t-values in parentheses.

Table 40a

Summary Results of Treynor-Mazuy's Market Timing Regression

$$r_{pt} - r_{Lt} = \alpha_p + \beta_{1p}(r_{mt} - r_{Lt}) + \beta_{2p}(r_{mt} - r_{Lt})^2 + \epsilon_{pt}$$

Without a Correction for Heteroscedasticity
When the 10 Active Strategies Manage 12 Equal-Weighted Industries
(32 quarter estimating period, simple probability assessment)

	Mean	S.Dev	Min	Max	Number of Positive		Number of Negative	
					5%	1%	5%	1%
Panel A : 1934-86, With Leverage								
R^2	.459	.146	.282	.652				
α	.004	.010	-.024	.012	9		1	
(t-value)	(1.875)	(1.362)	(-1.561)	(2.903)	7	6	...	...
β_1	.864	.864	.066	2.626				
(t-value)	(13.595)	(3.984)	(8.933)	(19.546)				
β_2	.359	1.444	-.406	4.510	3		7	
(t-value)	(-.866)	(2.266)	(-2.711)	(4.614)	1	1	5	4
Panel B : 1966-86, With Leverage								
R^2	.603	.040	.572	.674				
α	.006	.006	.003	.018	10		...	
(t-value)	(.778)	(.192)	(.600)	(1.304)	...	...	...	...
β_1	.784	.779	.041	2.152				
(t-value)	(11.107)	(1.011)	(10.331)	(12.929)				
β_2	.695	.586	.056	1.877	10		...	
(t-value)	(1.645)	(.306)	(.908)	(1.843)	7	...	...	...
Panel C : 1934-86, Without Leverage								
R^2	.492	.166	.282	.719				
α	.004	.005	-.007	.010	8		2	
(t-value)	(1.805)	(1.375)	(-1.010)	(3.018)	7	6	...	...
β_1	.603	.492	.066	1.361				
(t-value)	(14.884)	(4.993)	(8.933)	(22.550)				
β_2	.039	.504	-.306	1.211	3		7	
(t-value)	(-.911)	(1.904)	(-2.711)	(2.813)	2	1	5	3
Panel D : 1966-86, Without Leverage								
R^2	.613	.051	.572	.691				
α	.006	.005	.003	.014	10		...	
(t-value)	(.929)	(.303)	(.686)	(1.428)	...	...	...	...
β_1	.570	.483	.041	1.252				
(t-value)	(11.380)	(1.335)	(10.331)	(13.460)				
β_2	.311	.228	.056	.760	10		...	
(t-value)	(1.352)	(.668)	(.263)	(1.843)	6	...	...	...

Note: t-values in parentheses.

Table 40b

Summary Results of Treynor-Mazuy's Market Timing Regression

$$r_{pt} - r_{Lt} = \alpha_p + \beta_{1p}(r_{mt} - r_{Lt}) + \beta_{2p}(r_{mt} - r_{Lt})^2 + \epsilon_{pt}$$

With a Correction for Heteroscedasticity
When the 10 Active Strategies Manage 12 Equal-Weighted Industries
(32 quarter estimating period, simple probability assessment)

					Number of			
					Positive		Negative	
	Mean	S.Dev	Min	Max	5%	1%	5%	1%
				Panel A : 1934-86, With Leverage				
R^2	.996	.006	.983	1.000				
α	.004	.010	-.024	.012	9		1	
(t-value)	(2.244)	(1.807)	(-1.897)	(3.832)	7	6	1	...
β_1	.864	.864	.066	2.626				
(t-value)	(8.166)	(3.633)	(4.142)	(13.448)				
β_2	.359	1.444	-.406	4.510	3		7	
(t-value)	(-.323)	(1.186)	(-1.196)	(2.722)	1	1	...	...
				Panel B : 1966-86, With Leverage				
R^2	.994	.007	.979	1.000				
α	.006	.006	.003	.018	10		...	
(t-value)	(.743)	(.167)	(.544)	(1.202)	...	...	...	...
β_1	.784	.779	.041	2.152				
(t-value)	(7.133)	(.781)	(6.590)	(8.708)				
β_2	.695	.586	.056	1.877	10		...	
(t-value)	(.838)	(.167)	(.457)	(.952)	...	...	...	...
				Panel C : 1934-86, Without Leverage				
R^2	.998	.003	.990	1.000				
α	.004	.005	-.007	.010	8		2	
(t-value)	(2.121)	(1.739)	(-1.173)	(3.832)	7	5	...	...
β_1	.603	.492	.066	1.361				
(t-value)	(9.348)	(4.601)	(4.142)	(17.174)				
β_2	.039	.504	-.306	1.211	3		7	
(t-value)	(-.322)	(1.026)	(-1.196)	(1.799)	1	...	...	...
				Panel D : 1966-86, Without Leverage				
R^2	.997	.001	.995	.999				
α	.006	.005	.003	.014	10		...	
(t-value)	(.881)	(.258)	(.671)	(1.316)	...	...	...	...
β_1	.570	.483	.041	1.252				
(t-value)	(7.456)	(1.217)	(6.590)	(9.543)				
β_2	.311	.228	.056	.760	10		...	
(t-value)	(.692)	(.342)	(.145)	(.952)	...	...	...	...

Note: t-values in parentheses.

Table 41a

Summary Results of Treynor-Mazuy's Market Timing Regression

$$r_{pt} - r_{Lt} = \alpha_p + \beta_{1p}(r_{mt} - r_{Lt}) + \beta_{2p}(r_{mt} - r_{Lt})^2 + \epsilon_{pt}$$

Without a Correction for Heteroscedasticity
When the 10 Active Strategies Manage 12 Value-Weighted Industries
(32 quarter estimating period, simple probability assessment)

					Number of			
					Positive		Negative	
	Mean	S.Dev	Min	Max	5%	1%	5%	1%
			Panel A : 1934-86, With Leverage					
R^2	.387	.154	.198	.640				
α	.004	.008	-.018	.011	9		1	
(t-value)	(1.608)	(1.145)	(-1.442)	(2.408)	7	3	...	...
β_1	.751	.737	.065	2.368				
(t-value)	(11.761)	(3.902)	(7.132)	(18.475)				
β_2	-.070	.825	-.547	2.364	1		9	
(t-value)	(-1.122)	(1.423)	(-2.064)	(2.845)	1	1	6	...
			Panel B : 1966-86, With Leverage					
R^2	.465	.083	.400	.635				
α	-.001	.003	-.006	.001	6		4	
(t-value)	(.023)	(.242)	(-.406)	(.226)	...	...	...	...
β_1	.640	.638	.035	1.842				
(t-value)	(8.466)	(1.551)	(7.282)	(11.800)				
β_2	.391	.589	-.807	1.393	9		1	
(t-value)	(1.106)	(.615)	(-.681)	(1.488)	...	...	...	...
			Panel C : 1934-86, Without Leverage					
R^2	.427	.182	.198	.704				
α	.004	.004	-.004	.007	8		2	
(t-value)	(1.562)	(1.079)	(-.702)	(2.408)	7	3	...	...
β_1	.535	.428	.065	1.284				
(t-value)	(13.159)	(5.159)	(7.132)	(22.023)				
β_2	-.267	.168	-.510	.056	1		9	
(t-value)	(-1.480)	(.703)	(-2.103)	(.147)	...	...	7	...
			Panel D : 1966-86, Without Leverage					
R^2	.490	.107	.400	.703				
α	-.001	.001	-.004	.001	6		4	
(t-value)	(.031)	(.221)	(-.401)	(.226)	...	...	...	...
β_1	.478	.412	.035	1.175				
(t-value)	(8.998)	(2.135)	(7.282)	(13.537)				
β_2	.102	.544	-1.355	.812	8		2	
(t-value)	(.792)	(1.075)	(-2.055)	(1.534)	...	...	1	...

Note: t-values in parentheses.

Table 41b

Summary Results of Treynor-Mazuy's Market Timing Regression

$$r_{pt} - r_{Lt} = \alpha_p + \beta_{1p}(r_{mt} - r_{Lt}) + \beta_{2p}(r_{mt} - r_{Lt})^2 + \epsilon_{pt}$$

With a Correction for Heteroscedasticity
When the 10 Active Strategies Manage 12 Value-Weighted Industries
(32 quarter estimating period, simple probability assessment)

	Mean	S.Dev	Min	Max	Number of Positive 5%	Number of Positive 1%	Number of Negative 5%	Number of Negative 1%
			Panel A : 1934-86, With Leverage					
R^2	.987	.015	.951	.999				
α	.004	.008	-.018	.011	9		1	
(t-value)	(1.887)	(1.350)	(-1.431)	(3.076)	7	5	...	...
β_1	.751	.737	.065	2.368				
(t-value)	(7.530)	(2.932)	(4.176)	(13.515)				
β_2	-.070	.825	-.547	2.364	1		9	
(t-value)	(-.616)	(.790)	(-1.171)	(1.545)	...	...	...	...
			Panel B : 1966-86, With Leverage					
R^2	.990	.020	.932	1.000				
α	-.001	.003	-.006	.001	6		4	
(t-value)	(.030)	(.237)	(-.385)	(.230)	...	...	...	...
β_1	.640	.638	.035	1.842				
(t-value)	(5.979)	(.954)	(5.374)	(8.485)				
β_2	.391	.589	-.807	1.393	9		1	
(t-value)	(.654)	(.371)	(-.395)	(.841)	...	...	...	...
			Panel C : 1934-86, Without Leverage					
R^2	.994	.008	.976	1.000				
α	.004	.004	-.004	.007	8		2	
(t-value)	(1.802)	(1.289)	(-.697)	(3.076)	6	5	...	...
β_1	.535	.428	.065	1.284				
(t-value)	(8.683)	(4.378)	(4.716)	(18.587)				
β_2	-.267	.168	-.510	.056	1		9	
(t-value)	(-.795)	(.399)	(-1.171)	(.095)	...	...	...	...
			Panel D : 1966-86, Without Leverage					
R^2	.998	.003	.990	1.000				
α	-.001	.001	-.004	.001	6		4	
(t-value)	(.041)	(.210)	(-.357)	(.230)	...	...	...	...
β_1	.478	.412	.035	1.175				
(t-value)	(6.362)	(1.644)	(5.374)	(10.832)				
β_2	.102	.544	-1.355	.812	8		2	
(t-value)	(.444)	(.715)	(-1.494)	(.854)	...	...	...	...

Note: t-values in parentheses.

Table 42a

Summary Results of Henriksson-Merton's Market Timing Regression

$$r_{pt} - r_{Lt} = \alpha_p + \beta_{1p}(r_{mt} - r_{Lt}) + \beta_{2p}y_t + \epsilon_{pt}$$

Without a Correction for Heteroscedasticity
When the 10 Active Strategies Manage 12 Equal-Weighted Industries
(32 quarter estimating period, simple probability assessment)

	Mean	S.Dev	Min	Max	Number of Positive 5%	Number of Positive 1%	Number of Negative 5%	Number of Negative 1%
				Panel A : 1934-86, With Leverage				
R^2	.451	.153	.266	.658				
α	-.288	1.759	-5.286	.775		7		3
(t-value)	(.908)	(1.523)	(-2.486)	(2.215)	5	...	...	1
β_1	.998	1.138	.046	3.556				
(t-value)	(7.849)	(3.849)	(3.515)	(13.342)				
β_2	-.280	.580	-.101	1.846		5		5
(t-value)	(.175)	(1.778)	(-1.635)	(3.796)	3	1	...	...
				Panel B : 1966-86, With Leverage				
R^2	.603	.040	.572	.676				
α	.055	.269	-.186	.618		2		8
(t-value)	(-.106)	(.209)	(-.259)	(.291)	...	...	...	...
β_1	.927	.890	.053	2.500				
(t-value)	(7.121)	(.334)	(6.884)	(7.938)				
β_2	.302	.246	.025	.733		10		...
(t-value)	(1.635)	(.308)	(.908)	(1.839)	7	...	...	...
				Panel C : 1934-86, Without Leverage				
R^2	.485	.173	.266	.720				
α	.059	.694	-1.508	.587		7		3
(t-value)	(.924)	(1.385)	(-1.626)	(2.215)	5	...	...	...
β_1	.648	.588	.046	1.618				
(t-value)	(8.501)	(4.198)	(3.515)	(14.837)				
β_2	.098	.199	-.081	.510		5		5
(t-value)	(.069)	(1.434)	(-1.635)	(2.407)	2	1	...	...
				Panel D : 1966-86, Without Leverage				
R^2	.613	.051	.572	.692				
α	.277	.485	-.184	1.070		4		6
(t-value)	(.094)	(.450)	(-.256)	(.802)	...	...	...	...
β_1	.639	.503	.053	1.320				
(t-value)	(7.053)	(.191)	(6.884)	(7.338)				
β_2	.146	.098	.025	.332		10		...
(t-value)	(1.376)	(.621)	(.403)	(1.839)	6	...	...	...

Note: t-values in parentheses.

Table 42b

Summary Results of Henriksson-Merton's Market Timing Regression

$$r_{pt} - r_{Lt} = \alpha_p + \beta_{1p}(r_{mt} - r_{Lt}) + \beta_{2p} y_t + \epsilon_{pt}$$

With a Correction for Heteroscedasticity
When the 10 Active Strategies Manage 12 Equal-Weighted Industries
(32 quarter estimating period, simple probability assessment)

	Mean	S.Dev	Min	Max	Number of Positive 5%	Number of Positive 1%	Number of Negative 5%	Number of Negative 1%
				Panel A : 1934-86, With Leverage				
R^2	.996	.006	.982	1.000				
α	-.288	1.759	-5.286	.775	7		3	
(t-value)	(.791)	(1.320)	(-2.125)	(1.962)	4	...	1	...
β1	.998	1.138	.046	3.556				
(t-value)	(4.320)	(1.383)	(2.772)	(6.494)				
β2	-.280	.580	-.101	1.846	5		5	
(t-value)	(.172)	(.983)	(-.764)	(2.238)	1	...	...	...
				Panel B : 1966-86, With Leverage				
R^2	.989	.007	.976	1.000				
α	.055	.269	-.186	.618	2		8	
(t-value)	(-.095)	(.175)	(-.224)	(.235)	...	...	...	...
β1	.927	.890	.053	2.500				
(t-value)	(3.927)	(.280)	(3.747)	(4.629)				
β2	.302	.246	.025	.733	10		...	
(t-value)	(1.002)	(.195)	(.557)	(1.139)	7	...	...	...
				Panel C : 1934-86, Without Leverage				
R^2	.998	.002	.995	1.000				
α	.059	.694	-1.508	.587	7		3	
(t-value)	(.776)	(1.222)	(-1.445)	(1.962)	4	...	...	...
β1	.648	.588	.046	1.618				
(t-value)	(4.799)	(1.938)	(2.772)	(8.710)				
β2	.098	.199	-.081	.510	5		5	
(t-value)	(.134)	(.836)	(-.764)	(1.552)	...	...	...	...
				Panel D : 1966-86, Without Leverage				
R^2	.992	.006	.978	1.000				
α	.277	.485	-.184	1.070	4		6	
(t-value)	(.070)	(.375)	(-.221)	(.664)	...	...	...	...
β1	.639	.503	.053	1.320				
(t-value)	(3.966)	(.314)	(3.747)	(4.500)				
β2	.146	.098	.025	.332	10		...	
(t-value)	(.848)	(.381)	(.263)	(1.139)	...	...	...	...

Note: t-values in parentheses.

Table 43a

Summary Results of Henriksson-Merton's Market Timing Regression

$$r_{pt} - r_{Lt} = \alpha_p + \beta_{1p}(r_{mt} - r_{Lt}) + \beta_{2p}y_t + \epsilon_{pt}$$

Without a Correction for Heteroscedasticity
When the 10 Active Strategies Manage 12 Value-Weighted Industries
(32 quarter estimating period, simple probability assessment)

	Mean	S.Dev	Min	Max	Number of Positive 5%	Number of Positive 1%	Number of Negative 5%	Number of Negative 1%
Panel A : 1934-86, With Leverage								
R^2	.379	.157	.188	.629				
α	.291	.755	-1.923	.724	9		1	
(t-value)	(.995)	(.825)	(-1.064)	(1.753)	3	...	...	...
β_1	.760	.815	.054	2.662				
(t-value)	(6.379)	(2.792)	(3.352)	(11.753)				
β_2	.024	.175	-.082	.537	3		7	
(t-value)	(-.296)	(.634)	(-.913)	(1.299)	...	...	...	...
Panel B : 1966-86, With Leverage								
R^2	.463	.085	.396	.638				
α	-.289	.558	-1.510	.669	1		9	
(t-value)	(-.298)	(.258)	(-.775)	(.296)	...	...	...	...
β_1	.702	.644	.044	1.651				
(t-value)	(5.162)	(.532)	(4.729)	(6.182)				
β_2	.134	.288	-.546	.574	9		1	
(t-value)	(.935)	(.677)	(-1.045)	(1.382)	...	...	...	...
Panel C : 1934-86, Without Leverage								
R^2	.421	.186	.188	.704				
α	.429	.177	.116	.676	10		...	
(t-value)	(1.159)	(.536)	(.143)	(1.753)	3	...	...	...
β_1	.494	.409	.054	1.221				
(t-value)	(6.828)	(3.034)	(3.352)	(12.049)				
β_2	-.077	.046	-.155	-.021	...		10	
(t-value)	(-.710)	(.159)	(-.913)	(-.363)	...	...	...	...
Panel D : 1966-86, Without Leverage								
R^2	.488	.109	.396	.704				
α	-.030	.453	-.739	1.160	2		8	
(t-value)	(-.159)	(.408)	(-.728)	(.920)	...	...	...	...
β_1	.485	.363	.044	.956				
(t-value)	(5.175)	(.492)	(4.729)	(6.161)				
β_2	.016	.249	-.632	.353	8		2	
(t-value)	(.614)	(1.096)	(-2.177)	(1.510)	...	...	1	...

Note: t-values in parentheses.

Table 43b

Summary Results of Henriksson-Merton's Market Timing Regression

$$r_{pt} - r_{Lt} = \alpha_p + \beta_{1p}(r_{mt} - r_{Lt}) + \beta_{2p}y_t + \epsilon_{pt}$$

With a Correction for Heteroscedasticity
When the 10 Active Strategies Manage 12 Value-Weighted Industries
(32 quarter estimating period, simple probability assessment)

	Mean	S.Dev	Min	Max	Number of Positive	Positive 5%	Positive 1%	Number of Negative	Negative 5%	Negative 1%
Panel A : 1934-86, With Leverage										
R^2	.992	.007	.979	1.000						
α	.291	.755	-1.923	.724	9			1		
(t-value)	(.971)	(.794)	(-.828)	(1.778)		3	...		...	...
β_1	.760	.815	.054	2.662						
(t-value)	(3.742)	(.930)	(2.674)	(5.375)						
β_2	.024	.175	-.082	.537	3			7		
(t-value)	(-.186)	(.376)	(-.566)	(.739)		...	...		...	...
Panel B : 1966-86, With Leverage										
R^2	.982	.019	.928	1.000						
α	-.289	.558	-1.510	.669	1			9		
(t-value)	(-.268)	(.224)	(-.644)	(.274)		...	...		...	...
β_1	.702	.644	.044	1.651						
(t-value)	(3.246)	(.167)	(3.097)	(3.512)						
β_2	.134	.288	-.546	.574	9			1		
(t-value)	(.646)	(.473)	(-.728)	(.913)		...	...		...	...
Panel C : 1934-86, Without Leverage										
R^2	.994	.006	.983	1.000						
α	.429	.177	.116	.676	10			...		
(t-value)	(1.081)	(.576)	(.129)	(1.778)		3	...		...	...
β_1	.494	.409	.054	1.221						
(t-value)	(4.132)	(1.412)	(2.674)	(6.690)						
β_2	-.077	.046	-.155	-.021	...			10		
(t-value)	(-.435)	(.116)	(-.566)	(-.193)		...	...		...	...
Panel D : 1966-86, Without Leverage										
R^2	.989	.005	.983	.998						
α	-.030	.453	-.739	1.160	2			8		
(t-value)	(-.137)	(.389)	(-.623)	(.917)		...	...		...	...
β_1	.485	.363	.044	.956						
(t-value)	(3.293)	(.234)	(3.097)	(3.810)						
β_2	.016	.249	-.632	.353	8			2		
(t-value)	(.403)	(.832)	(-1.807)	(.901)		...	...		1	...

Note: t-values in parentheses.

Figure 1a

Geometric Means and Standard Deviations of Annual Portfolio Returns for 10 Power Policies with Twelve Equal-Weighted Industry Indices, 1934-1986
(Quarterly revision, with leverage, 32 quarter estimating period)

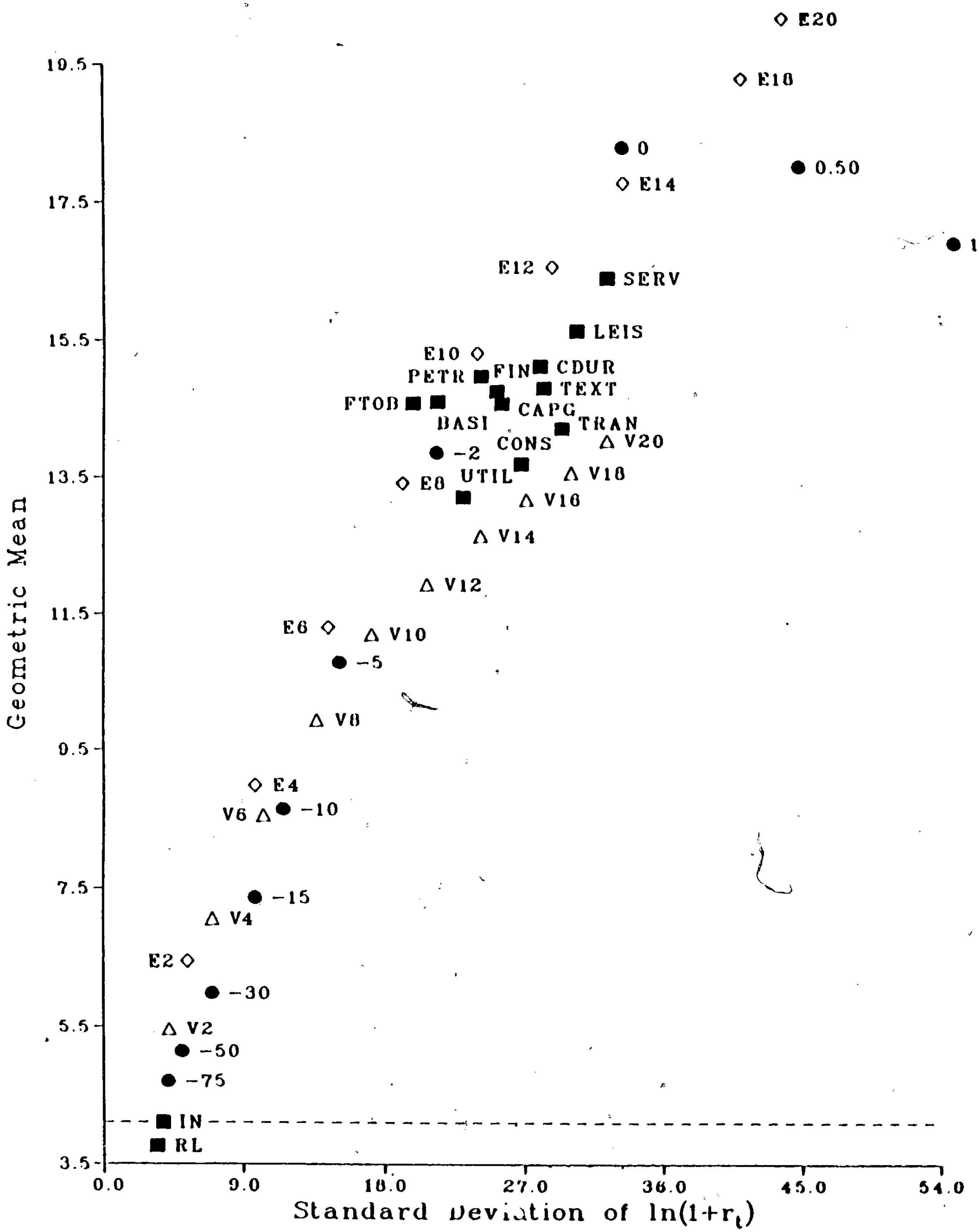


Figure 1b

Geometric Means and Standard Deviations of Annual Portfolio Returns for 10 Power Policies with Twelve Equal-Weighted Industry Indices, 1966-1986 (Quarterly revision, with leverage, 32 quarter estimating period)

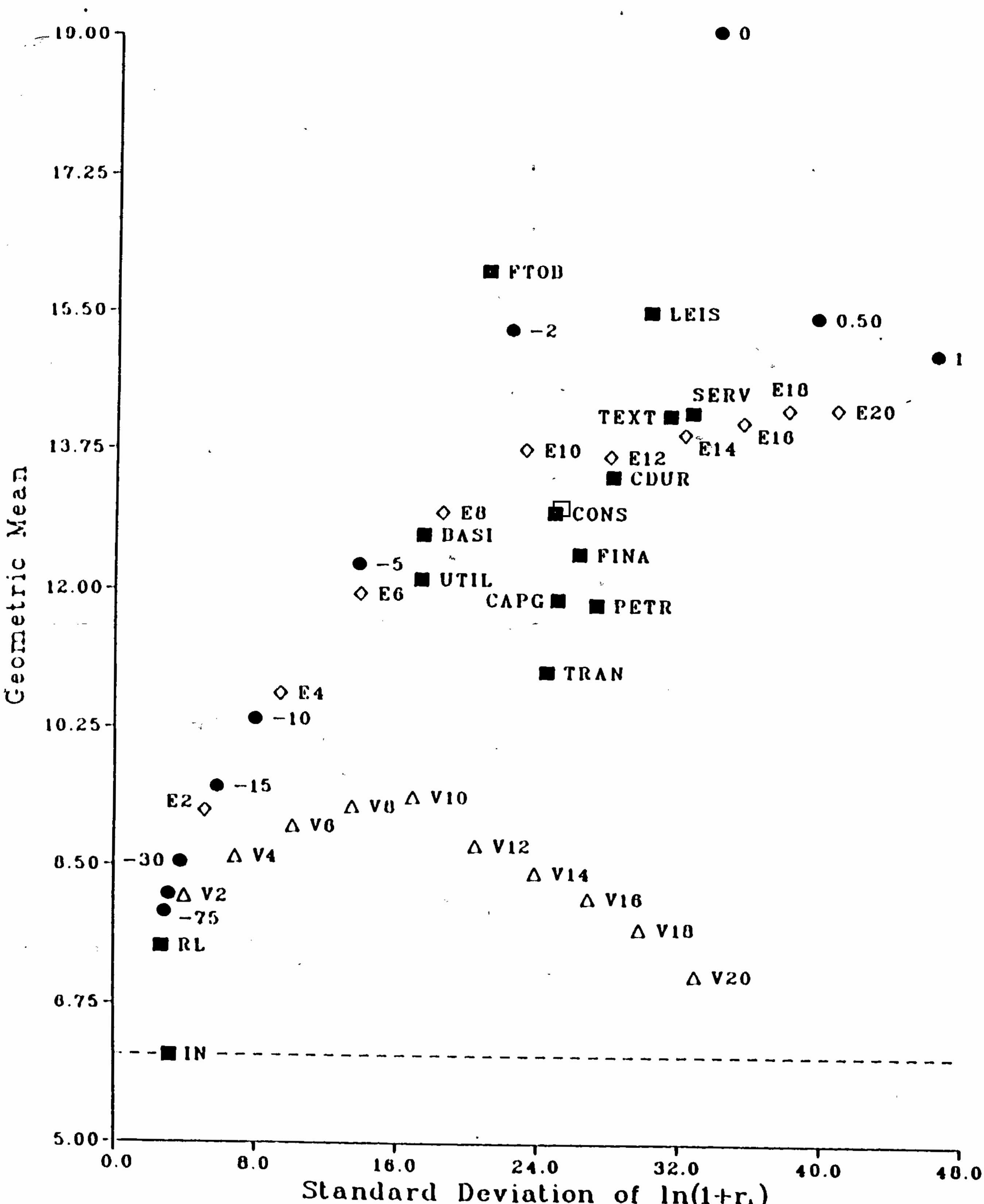


Figure 1c

Geometric Means and Standard Deviations of Annual Portfolio Returns for 10 Power Policies with Twelve Equal-Weighted Industry Indices, 1934-1986 (Quarterly revision, without leverage, 32 quarter estimating period)

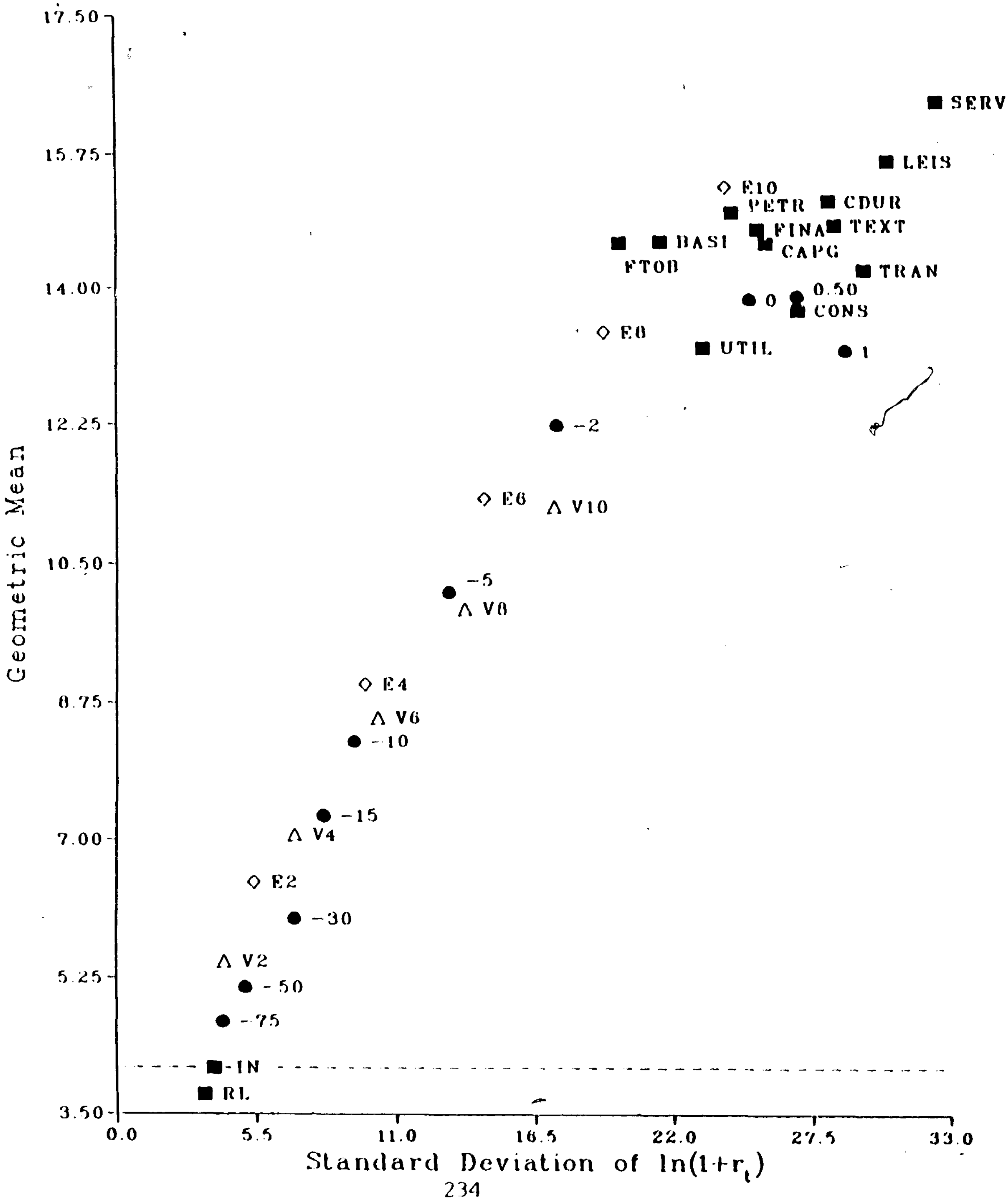


Figure 1d

Geometric Means and Standard Deviations of Annual Portfolio Returns for 10 Power Policies with Twelve Equal-Weighted Industry Indices, 1966-1986 (Quarterly revision, without leverage, 32 quarter estimating period)

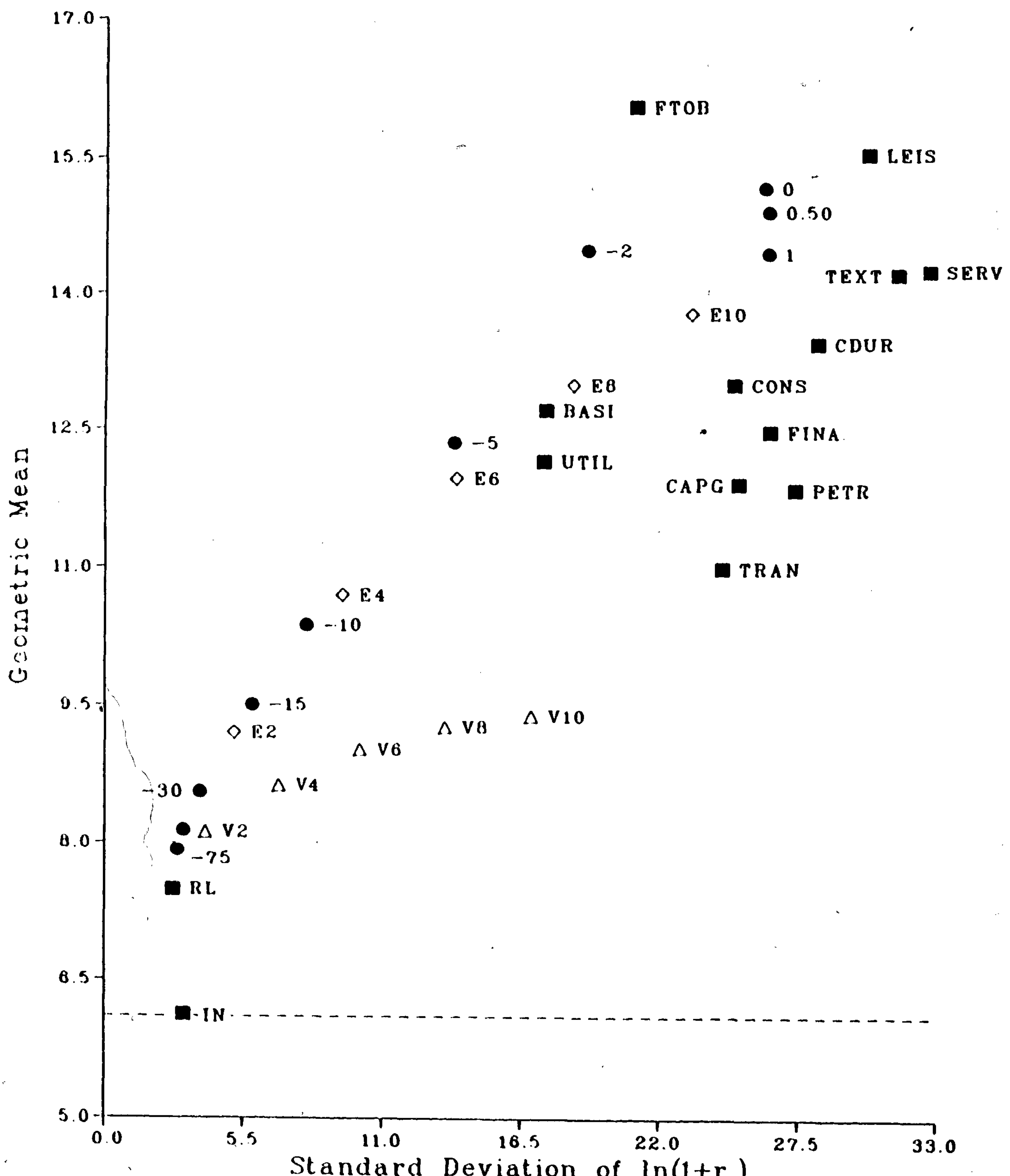


Figure 2a

Geometric Means and Standard Deviations of Annual Portfolio Returns for 10 Power Policies with Twelve Value-Weighted Industry Indices, 1934-1986 (Quarterly revision, with leverage, 32 quarter estimating period)

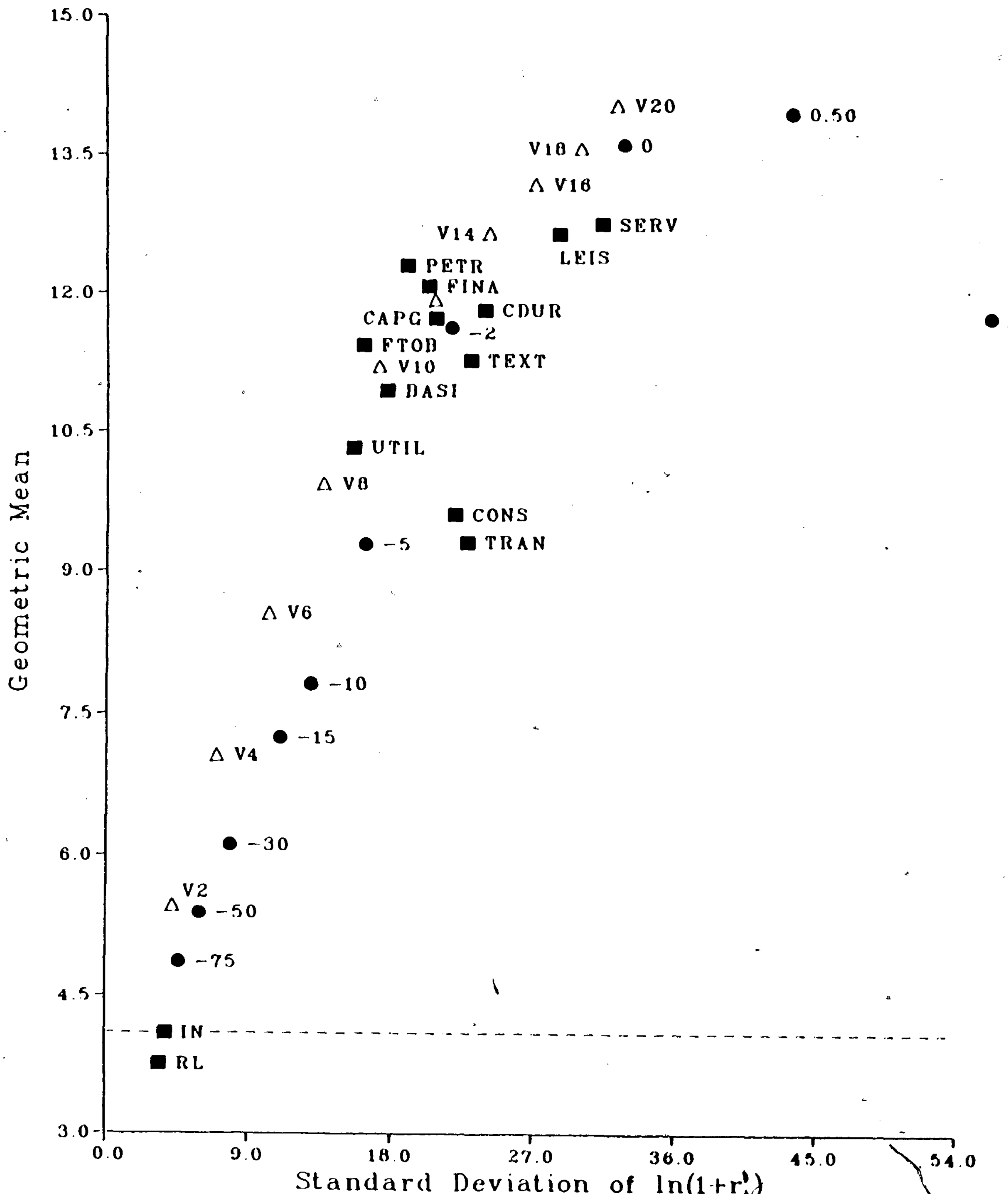


Figure 2b

Geometric Means and Standard Deviations of Annual Portfolio Returns for 10 Power Policies with Twelve Value-Weighted Industry Indices, 1966-1986 (Quarterly revision, with leverage, 32 quarter estimating period)

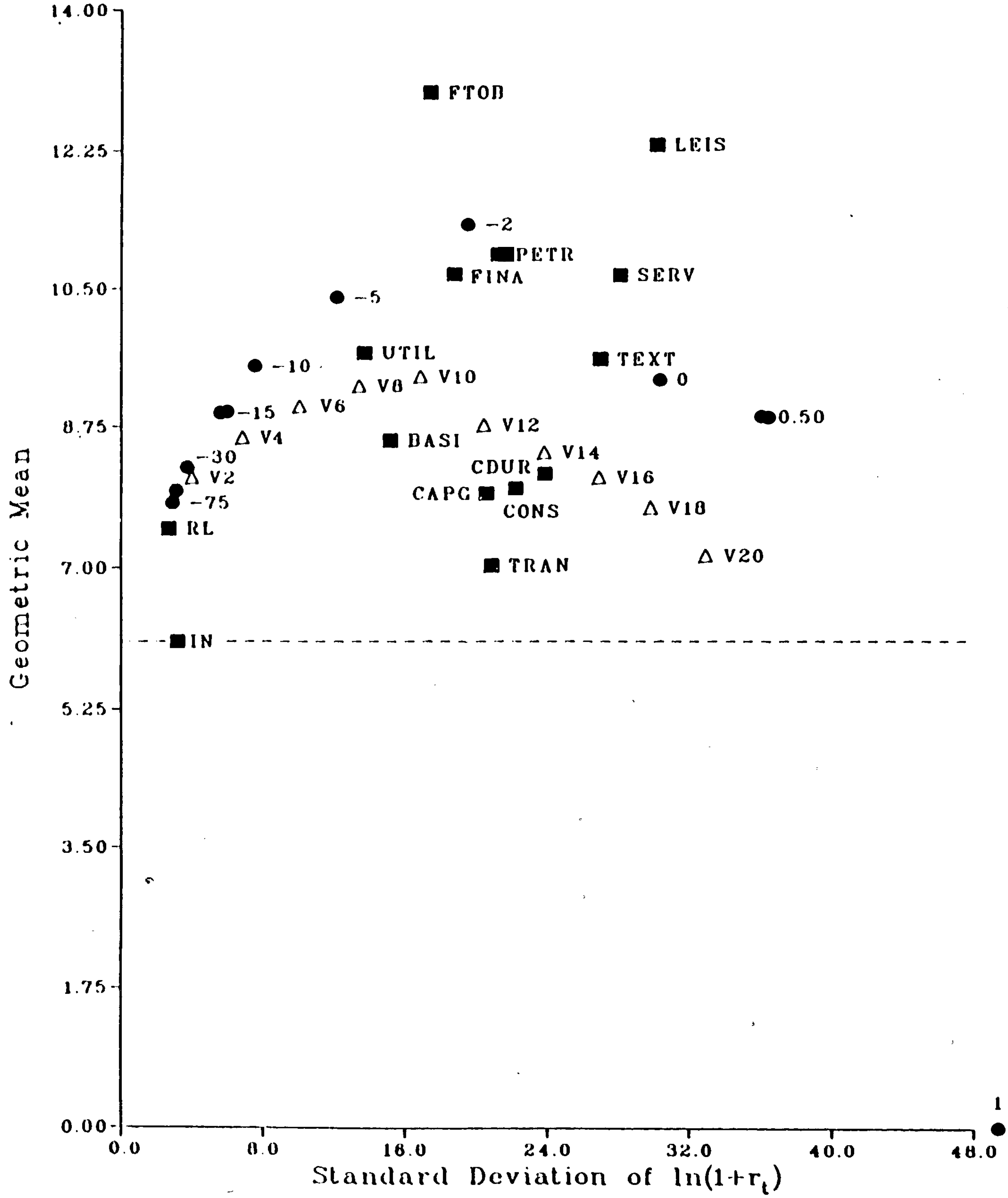


Figure 2c

Geometric Means and Standard Deviations of Annual Portfolio Returns for 10 Power Policies with Twelve Value-Weighted Industry Indices, 1934-1986 (Quarterly revision, without leverage, 32 quarter estimating period)

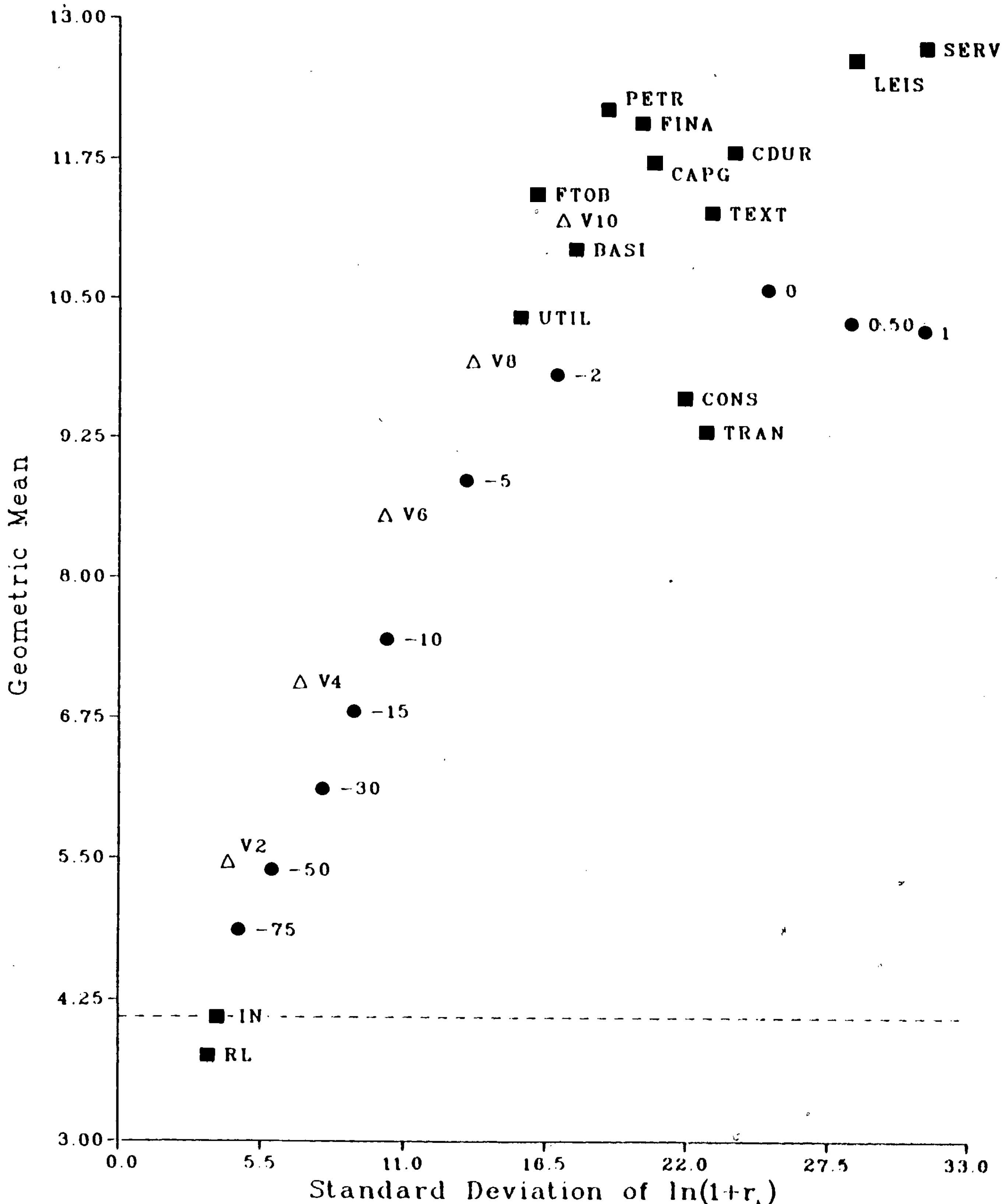


Figure 2d

Geometric Means and Standard Deviations of Annual Portfolio Returns for 10 Power Policies with Twelve Value-Weighted Industry Indices, 1966-1986 (Quarterly revision, without leverage, 32 quarter estimating period)

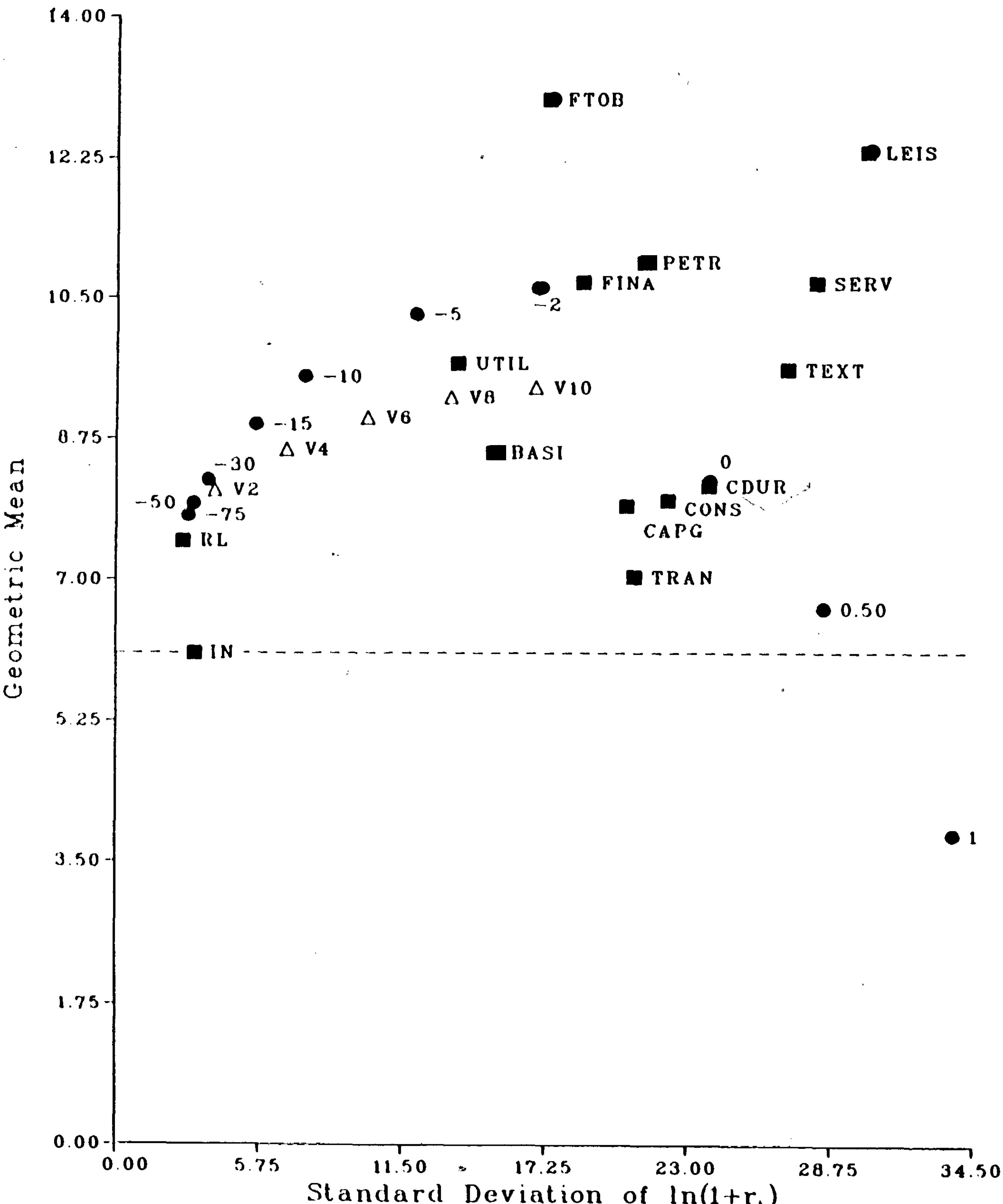
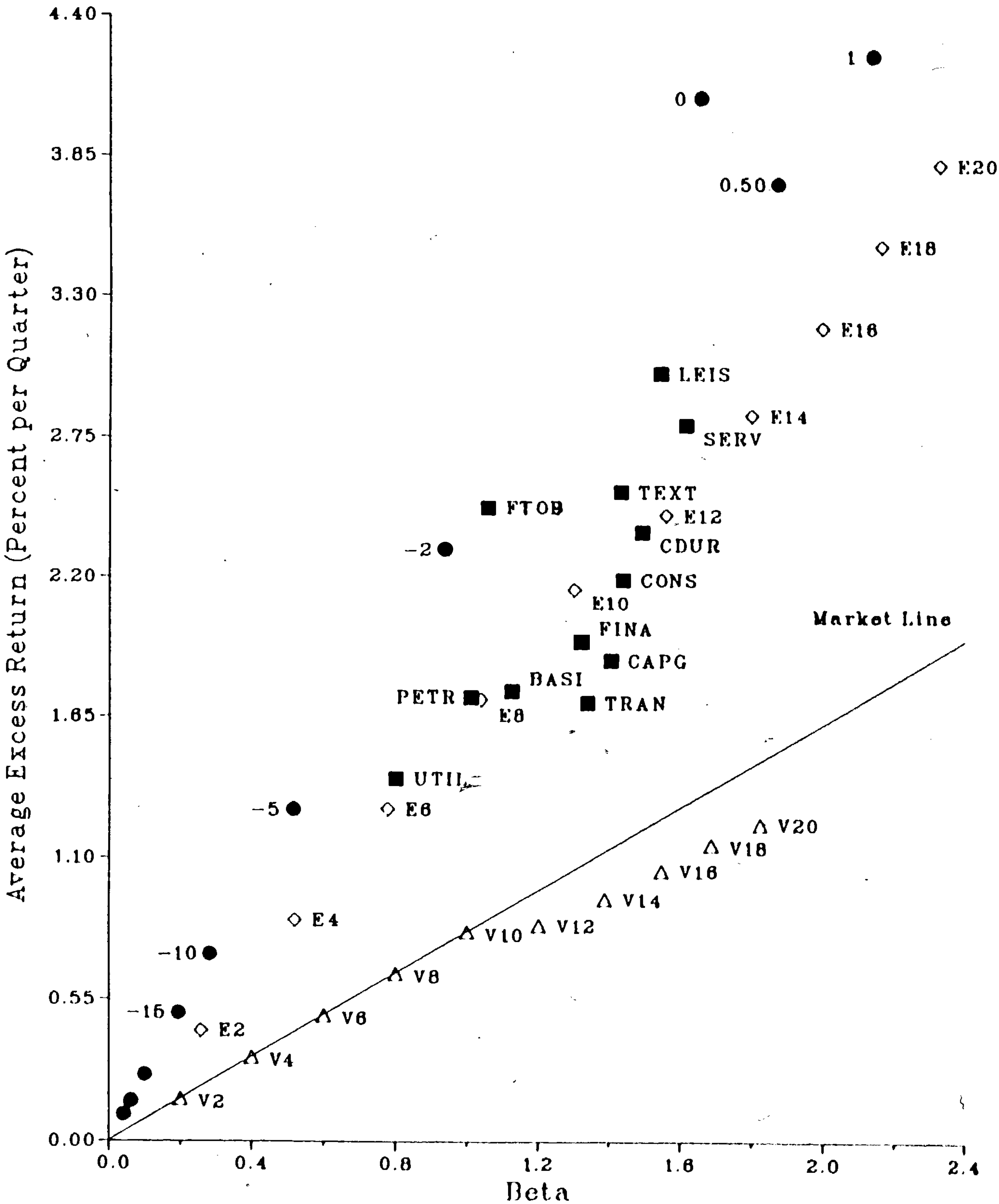


Figure 3

Average Excess Returns and Betas of Quarterly Portfolio Returns for 10 Power Policies With Twelve Equal-Weighted Industry Indices and Equal- and Value-Weighted Benchmarks, 1966-86 (32 quarter estimating period, with leverage)



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