A STUDY OF MARKET LINE INVESTMENT PERFORMANCE FEES

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I. Introduction

An "incentive" or "performance" fee is compensation to a portfolio manager that varies according to investment results rather than solely the amount of assets under management. The determination of a fair basis for evaluating investment results is of concern to both economists and legislators. The purpose of this essay is to examine the impact on advisory compensation of the use of two types of performance fee arrangements. The basic difference in the plans is the method of measuring investment performance. The first (Plan 1) is of the type used in current practice, where performance is measured by comparing fund return directly with that of a market index, such as the Standard and Poor's 500 Stock Composite Index. The second (Plan 2) employs the "market line" type of risk adjustment usually associated with the Sharpe [ ] - Lintner [ ] Capital Asset Pricing Model (CAPM), where performance is measured by comparing fund return with that of a risk ("beta") adjusted market portfolio.

The use of performance fees to reward investment company advisers is now commonplace. A significant portfion of all investment companies, particularly those with growth oriented investment objectives, have performance fee advisory contracts. In mid-1966 there were only four mutual funds with performance fees, but one year later there were 16. By June 1970 the number had risen to 128, with 52 additional performance fee contracts proposed for

funds whose registration statements were pending at the Securities and Exchange Commission. Reflecting this dramatic trend, approximately 40 percent of the registered investment companies which commenced operation in 1968 and 1969 proposed to use performance fee arrangements.[2/] However, changes in the Investment Advisers Act, which regulates the type of performance fees that can be used, brought a halt to the trend. As of January 1972, 103 of 999 active registered investment companies had performance fee plans.[3/]

The regulation of performance fees began in 1940 with the passage of the Investment Advisers Act. With the Act Congress prohibited the use of any type of performance fee by Registered Investment Advisers except for the fees charged to registered investment companies by their advisers. During the following 30 years the types of performance fees used by fund advisers typically fell into two categories; fees based on performance relative to a market index and fees based solely on the performance of the fund itself without reference to the performance of a market index (e.g., twenty percent of the capital gains). However, the payments were typically one way. Bonuses were paid when a fund outperformed on index, but no penalties (or disproportionately small penalties) were imposed when the index outperformed the fund. In the Investment Company Amendments Act of 1970 Congress required that any performance fee charged to registered investment companies be symmetric, that is penalties for substandard investment performance must be symmetrical with rewards for superior performance. Fees not related to some appropriate index of securities prices (e.g. percentage of capital gain type fees) were prohibited. The 1970 Act gave the Securities and Exchange Commission the authority to determine what constituted an appropriate index of securities prices. The

1970 Act also extended the use of performance fees to most other types of investment advisory accounts where the assets under management exceed $1 million.

However, a further problem exists with non-risk adjusted type performance fee plans which is well known to economists. The problem was also recognized by the Securities and Exchange Commission, and stated succinctly in the letter of transmittal to the Institutional Investor Study[4/]. . .

> When an adviser is compensated on the basis of total return or return relative to an index having a lower volatility than the portfolio itself, an incentive is created for the manager to assume greater risk. Thus, when inventive fees are present, . . . (it) appears desirable to eliminate as fully as possible the realization of compensation by investment managers based in part on risk borne by portfolio beneficiaries.

A possible solution to the problem was contained in the study[4/]. . .

> To accomplish this end the Commission intends to give serious and prompt consideration to requiring that incentive fees be based only on volatility adjusted investment returns. Incentive compensation would thus be permitted only on that portion of total investment return that is in excess of what general market movements affecting securities displaying equivalent volatility would produce on an unmanaged basis. Technical methods for basing incentive fees on such risk or volatility adjusted returns were adopted for analytic purposes by the Study. Although the techniques employed are of relatively recent origin, it appears that measures of risk adjusted investment "performance" such as employed in the Study are feasible. Their use, as well as other methods for accomplishing this end that amy be developed, can provide appropriate and unbiased methods of calculating managerial compensation that would discourage the assumption of excessive risk in managed portfolios, permit superior advisers to obtain additional compensation and permit the profitable operation of smaller economic units not having access to large and efficient sales organizations.

The Commission, via the 1970 Act essentially has the authority to require risk adjusted measures for incentive fee plans[5/]. . .

> The Commission now has authority under the Investment Advisers Act of 1940 as amended by the Investment Company Amendments Act of 1970 to determine an appropriate index or other measure of investment performance for incentive compensation purposes that reflects the degree of volatility displayed by managed portfolios.

To date the SEC has taken no further steps to this end. In a recent release the Commission laid down very general guidelines for the choice of an appropriate index.[6/]

> In determining whether an index is appropriate for a particular investment company, directors should consider factors such as the volatility, diversification of holdings, types of securities owned and objectives of the investment company. For example, for investment companies that invest in a broad range of common stocks, a broadly based market value weighted index of common stocks ordinarily would be an appropriate index, but an index based upon a relatively few large "blue chip" stocks would not. For investment companies that invest exclusively in a particular type of security or industry, either a specialized index that adequately represents the performance of that type of security or a broadly based market value weighted index ordinarily would be considered appropriate. Of course, if an investment company invests in a particular type of security an index which measures the performance of another particular type of security would not be appropriate.

On the question of risk adjustment, the following was added in a footnote.[7/]

> Technical methods for specifying incentive fees based upon risk or volatility adjusted returns are now being explored by the staff and a number of industry and academic groups as well as commercial enterprises. However, the Commission has not, at this time, arrived at any conclusions with respect to these methods.

The purpose of this paper is to present the results of our research on the impact of "market line" type risk adjustment on the compensation received by investment advisers. While it is understood that the CAPM is not the final answer in the search for performance measurement benchmarks, it indeed provides a convenient and familiar alternative to the clearly non-optimal solution of no risk adjustment. Hence our focus will be on the improvements resulting from a shift from Plan 1 to Plan 2. Specifically, our task is to answer the following questions.

(1) What impact to current practice and market line based fee plans have on the amount and volatility of advisory compensation? What differences result in shifting from Plan 1 to Plan 2? How are the changes related to the amount of shareholder borne risk, that is, to the fund beta values?

(2) How are the results for Plans 1 and 2 affected by changes in the way in which investment performance is measured, changes such as the use of a different market index or performance measurement horizon?

We have examined these questions both analytically and with the aid of simulation. Based on the CAPM, we have developed predictions of the effects of using the two fee plans and their modifications. Simulation has been used to determine the annual compensation results for each plan for an twelve year test period (1960-1971) for a group of 49 mutual funds.

It should be carefully noted that our methodology does not involve a specific examination of the behavior and advisory fee records of samples of mutual funds which had employed the two types of fee plans. While this would have been an obviously useful strategy, it is also an impossible one; an insufficient number of funds (and no low risk funds) have long enough plan 1 histories and none have plan 2 experience. Accordingly, our basic methodology will consist of examining the effect the alternative fee plans would have had on the amount and variability of advisory compensation of a sample non-incentive fee funds, using the actual historical performance of these funds as the basis for the incentive fee calculations. Using this approach we can examine the impact of the incentive fee plans while holding the investment risk of the

funds at the non-incentive fee levels; that is, given beta, how would the adoption of Plan 1 or 2 affect the level and volatility of advisory compensation. Based on these conditional results, we can make predictions as to the changes in advisory behavior that might result from the adoption of a performance fee, changes that would either increase the expected level or decrease the volatility of advisory compensation.

The remainder of the paper is organized as follows. Section II contains the answer to question 1, Section III the answer to question 2 and Section IV presents our conclusions and recommendations.

II. Comparison of Plans 1 and 2

This section is organized as follows: Part A develops the underlying theory; B describes the fee plans used in the simulations; C describes the measures used in evaluating compensation results; D describes the 49 fund simulation sample; E presents the empirical results and, F summarizes our findings.

A. Theory

The Capital Asset Pricing Model provides the foundation for our theoretical analysis of performance fees. We use the model to predict the nature of the relationship between the amount and volatility of performance fee compensation and fund beta values. While it is obviously not possible to predict exactly the simulation results, the CAPM will provide insights in order to understand the results obtained. Differences will result because the ex post form of the CAPM does not precisely explain realized risk-return

relationships, and because the actual fee plans simulated tend to be somewhat more complicated than that discussed in this part.[8/] Here we will focus on the main features of the plans leaving refinements to the simulation calculations.

The Capital Asset Pricing Model relates the expected return on a portfolio to its systematic risk as measured by beta (β_p). That is,

$$E(\tilde{R}_p) = R_F + \beta_p(E(\tilde{R}_M) - R_F) \quad (1)$$

where $E(\tilde{R}_p)$, $E(\tilde{R}_M)$ and R_F are the expected returns on the portfolio, market index and riskless bond respectively. Thus, the realized return during the period can be expressed as

$$\tilde{R}_p = R_F + \beta_p(\tilde{R}_M - R_F) + \tilde{\varepsilon}_p \quad (2)$$

where $\tilde{\varepsilon}_p$ is the residual (unsystematic) element of portfolio return which, under the CAPM hypothesis has a zero expected return. Realized values of $\tilde{\varepsilon}_p$ different from zero are evidence of superior ($\tilde{\varepsilon}_p > 0$) or inferior ($\tilde{\varepsilon}_p < 0$) investment performance.

Assuming the amount of the performance fee paid to the adviser is directly proportional to the return differential between the fund and the standard, $\tilde{R}_s$, then the fee paid, $\tilde{FEE}_p$, is given by

$$\tilde{FEE}_p = \delta(\tilde{R}_p - \tilde{R}_s) \quad (3)$$

where δ is the constant of proportionality between return differential and fee dollars.

Consider first the non-risk adjusted Plan 1. The comparison standard is simply the market return, $\tilde{R}_M$. Substituting for $\tilde{R}_p$ (from equation 2) and R_s into equation (3), we obtain

$$\tilde{FEE}_p = \delta\{(\beta_p - 1)(\tilde{R}_M - R_F) + \tilde{\varepsilon}_p \qquad (4)$$

Thus, the performance fee depends on the fund beta and the market risk premium $\tilde{R}_M - R_F$, as well as the CAPM performance measure $\tilde{\varepsilon}_p$. The expected fee is given by

$$E(\tilde{FEE}_p) = \delta(\beta_p - 1) \cdot E(R_M - R_F) \qquad (5)$$

Assuming the expected market risk premium is positive, the expected fee is an increasing function of β_p. For "neutral" performance relative to the CAPM standard (i.e. $\tilde{\varepsilon}_p = 0$), the expected fee is positive for funds with betas greater than 1.0, and negative for funds with betas less than 1.0. Thus, Plan 1 has a built in bias in favor of higher risk funds. The effect is illustrated in figure 2.1.

The variance of the Plan 1 incentive fee is given by

$$\sigma(Fee_p) = \delta^2(\beta_p - 1.0)^2 \sigma^2(\tilde{R}_m - R_f) + \sigma^2(\varepsilon_p^2) \qquad (6)$$

where $\sigma^2(R_m - R_f)$ and $\sigma^2(\tilde{\varepsilon}_p)$ are the variances of the market risk premium and residual return component respectively.

The equation shows Plan 1 fee variation to have two components -- a market term resulting from bias in the performance measure and a residual term resulting from incomplete portfolio diversification. The market component increases for beta differentials either side of $\beta_p = 1.0$. The CAPM however gives no indication of how the residual component will vary with β_p,

if at all. If $\sigma^2(\tilde{\varepsilon}_p)$ was independent of β_p, then $\sigma^2(F\tilde{E}E_p)$ would be a "V" shaped function of β_p with minimum value of $\beta_p = 1.0$. However, this is not the case. During the 12 year test period there was a strong positive relationship between $\sigma^2(\tilde{\varepsilon}_p)$ and β_p.[9] Using estimates of $\sigma^2(\tilde{\varepsilon}_p)$ for the 49-fund sample, we have estimated values for the market and residual components of fee variation. The results are listed in table 2.1 and illustrated in figure 2.2.[10] Since we are primarily concerned with the shape of the relationship, the scaling factor δ has been temporarily ignored. The $\sigma(F\tilde{E}E_p)$ vs. β_p relationship is reasonable flat for beta values less than 1.0, rising sharply for betas greater than 1.0. For the higher beta funds, the market component tends to be insignificant relative to the residual variation term. For low beta funds the market component, (resulting from the performance measurement bias) tends to dominate.

Consider now the second plan. The return standard ($\tilde{R}_s$) is equal the mixture of market index and risk free rate with the same beta as the fund, thus $\tilde{R}_s = R_F + \beta_p(\tilde{R}_M - R_F)$. Substituting for $\tilde{R}_p$ and $\tilde{R}_s$ in equation (3), the expression for $F\tilde{E}E_p$ is given by

$$F\tilde{E}E_p = \delta \cdot \tilde{\varepsilon}_p \tag{7}$$

Therefore, the expected fee is given by

$$E(F\tilde{E}E_p) = 0 \tag{8}$$

Thus, under CAPM assumptions, the expected performance fee for all beta values is zero. Thus, non-zero values of $\tilde{\varepsilon}_p$ will be rewarded or penalized in a consistent manner for the complete range of fund betas.

Fee volatility for Plan 2 is given by

$$\sigma^2(\tilde{FEE}_p) = \delta^2\sigma^2(\varepsilon_p) \qquad (9)$$

The removal of the performance measurement bias has eliminated the market component of fee variation, leaving the residual term. Thus, fee volatility for low beta funds will be substantially reduced, and largely unaffected for the higher beta funds. The relationship between $\sigma(\tilde{FEE}_p)$ and β_p is illustrated in figure 2.2 (see table 2.1 for numerical values for plan 2). The curve rises over the complete beta range, rising most sharply for the high beta values.

In summary, the CAPM predicts that Plan 1 performance fees will be biased in favor of higher risk funds. The model also predicts that the market line performance standard used in Plan 2 will eliminate the bias, and reduce fee variability over time, particularly for the lowest beta funds.

B. Fee Plans Simulated

The investment advisory contract between a mutual fund and its investment adviser defines the amount of compensation to be paid in return for investment advisory and administrative services. Performance fee contracts pay a management fee which is divided into two parts: (1) a basic fee based on net asset value, plus or minus (2) a fee based upon a comparison of the performance of the fund with that of an index.

The same basic fee arrangement was used for both of the simulated fee plans. The parameters were chosen to reflect values used in practice.[11/]

It is based on the following annual rates.

0.60% on the first $100 million of net assets
0.55% on the next $150 million
0.50% on the next $250 "
0.45% on the next $500 "
0.40% on net assets over $1,000 million.

In practice the basic fee is typically payable monthly and is computed on the net asset value of the Fund as of the close of business each day, at a rate of (1/365) of the annual figure. However, our simulations are based on monthly data, thus the base fee will be computed at the end of each month, at (1/12) the annual rate applied to the average net assets of the month (an average of beginning and ending net asset values).

The incentive fee component of the simulated plans is based on performance measured over a rolling 12 month measurement period.[12] For Plan 1, performance is measured by computing the difference in cummulative 12 month return between the fund and the Standard and Poor's 500 Composite Stock price index.[13] The returns on both fund and index are adjusted for all distributions.

For Plan 2, the performance standard is a risk adjusted index, based on the combination of the Standard and Poor's 500 index and 30 day treasury bills which produce the same beta over the 12 month period. Where levering was required to achieve a portfolio beta in excess of 1.0, borrowing was assumed to occur at the prime bank rate, adjusted to reflect the credit rating of the fund.[14] Performance is measured by computing the difference in cummulative return between the fund and this "market line" standard of equivalent beta.

Given the return differential over the past 12 months, the fund adviser receives additional compensation, or pays a penalty of an annualized rate of 0.022 percent of net present value for each percentage point of excess return,[15] up to a maximum of 0.40 percent for a return differential of 18 percent. For return differentials in excees of 18 percent, the incentive fee increment remains at 0.40 percent of assets.[16] The fee is based on the average net asset value during the 12 month horizon.[17] The fee is computed and paid monthly at one twelfth of the annualized rate.

In practice the return differentials are computed by comparing fund return (net of management expenses) to the return on the index. However, the index does not represent a viable investment alternative to the fund. The fund has expenses which are not directly related to the quality of the investment advice provided by the adviser. These include administrative expenses, liquidity costs, and the transactions costs associated with the investment of net cash flow to the fund. From a standpoint of fairness, the return on the standard should be adjusted to reflect these costs. The standard should not be adjusted, however, for an investment advisory fee, as the comparison portfolio is assumed to remain unchanged over time. Thus, in our simulations we have attempted to assign "reasonable" expenses to the comparison standard. While the cost parameters have been chosen to reflect industry practice, we will perform sensitivity analysis in Part III to examine the impact of changes.

Administrative expense ratios were assigned to reflect the costs of running a viable mutual fund. Annual expense ratios of 0.20, 0.25 and

0.30 percent were assigned to the comparison standards of large, medium and small funds.[18/] These values were estimated from an examination of administrative expense ratios charged by mutual funds during 1969.

Furthermore, it was assumed that at least 1.5 percent of the assets of the Plan 1 and 2 comparison standards would remain invested in liquid assets, namely 30 day treasury bills. This was done to retain comparability with real mutual funds which are forced to maintain liquidity reserves. The requirement has no impact for Plan 2 comparison standards with betas of 0.985 or less, since they already contain sufficient liquid assets. For Plan 2 standards with betas greater than this value, additional borrowing is assumed to provide the required liquid assets.

Additionally, net cash flows were assigned a brokerage cost of 0.75 percent of the amount invested. The net cash flows used were the industry average figures published by the Investment Company Institute. Thus, the performance standard for each fund was assumed to have a sales pattern equal to the industry (on a proportion of assets basis).

Algebraically, the expense ratio for year t (EX_t) can be stated as

$$EX_t = EXPA_t + CFLW_t * COM + CBAL * (R_{Bt} - R_{Lt}) \qquad (10)$$

where $EXPA_t$ is the administrative expense ratio for year t, $CFLW_t$ is the net cash flow into the portfolio during the previous 12 months (as a percentage of net assets), COM is the brokerage rate, CBAL is the percentage of net assets to be held in liquid assets, and $(R_{Bt} - R_{Lt})$ is the difference between the fund's borrowing and lending rates. Under Plan 2, for funds with beta values less than 0.985, the last term in equation 10 is not required. EX_t is subtracted from R_{St} prior to the computation of the return differential.

C. Measurement of Results

A computer simulation program was constructed to perform the month-by-month fee calculations for Plans 1 and 2 for each of the funds in the sample. Based on the actual return record for each fund, the program computes the amount of compensation that would have been received if the fund had used in turn each of the two plans. Details of the simulation calculations, and a sample set of results are described in appendix A. The simulations cover the period from 1961 through 1971, 1960 data having been used to initialize the simulation calculations.

The fund-by-fund simulation results are in dollar terms, that is the amounts of basic and performance fees computed during each month of the eleven-year period. Since the basic fee is the same under both plans, our focus is on the amount of incentive fee compensation that would have been paid. However, since the funds differ substantially in size (from a few million dollar of net assets to a few billion), comparisons based on total performance fee dollars would not be meaningful. The solution we have adopted is to focus on the ratio of performance fee dollars to dollars of basic fee. This ratio should not be substantially affected by fund size, and thus allows meaningful interfund comparisons. The ratio has a useful interpretation, since it represents the increase or decrease in basic fee resulting from the adoption of the performance fee. The fee ratios will be expressed in percentage terms. Thus, a fee ratio of 5 percent indicates the performance fee increased the advisers compensation by 5 percent over the basic fee alone.

We have used two types of fee ratios to measure the incentive compensation for each fund: an annual fee ratio (designated FEE_τ) and an 11 year ratio (designated FEE). FEE_τ equals the ratio of the performance fee in calendar year τ to the basic fee for the fund. It is given by

$$\tilde{FEE} = \frac{\sum_{t=1}^{12} \delta_1 \bar{A}_t (\tilde{R}_{pt} - \tilde{R}_{St})}{\sum_{t=1}^{12} \delta_2 A_t} = \frac{\delta}{12} \sum_{t=1}^{12} X_t (\tilde{R}_{Pt} - \tilde{R}_{St}) \tag{11}$$

where $\bar{A}_t$ = the average net asset value during the 12 months ending at month t

A_t = the average net assets during month t

$\tilde{R}_{pt}$ = the 12 month cummulative return on the portfolio to month t

$\tilde{R}_{Mt}$ = the 12 month market return

δ_1 = the monthly performance fee rate (e.g. 0.022%/12)

δ_2 = the monthly base fee rate ($\delta_2 \tilde{=} 0.55\%/12$)

δ = (δ_1/δ_2) ($\delta \tilde{=} 4.0$)

X_t = $(\bar{A}_t/\bar{A}_{12})$ is the average net assets during the 12 months ending in month t to the average net assets during the calendar year (note that $X_{12} = 1$).

The 11 year fee ratio, FEE, equals the ratio of the total performance fee compensation for the fund during the 11 year test period to the total basic fee for the fund.

Finally, we require a measure of the volatility of the advisory compensation received by the adviser. The measure we have adopted is the standard

deviation of the year-by-year fee ratios, designated SDF .

$$SDF = \left\{ 1/10 \sum_{t=1}^{11} (FEE_t - \overline{FEE}_t)^2 \right\} 1/2 \qquad (12)$$

where $\overline{FEE}_t$ is the mean value of the annual fee ratios for the fund. The standard deviation has a particularly useful interpretation. It measures the incremental volatility in total advisory compensation {(Performance + Basic Fees)/(Basic Fee)} resulting from adoption of the performance fee plan. In the absence of the incentive fee, SDF would equal zero. With the adoption of the fee plan, the fee ratios can be taken on non-zero values, resulting in a potential destabilizing influence on total advisory compensation.

After obtaining the fee ratios and fee ratios standard deviations, we will be particularly concerned with the relationship between these items and fund betas. The relationship is examined using regression analysis. For the annual fee ratios the regression equation is given by

$$FEE_{jt} = \gamma_0 + \gamma_1 \beta_{jt} \qquad j=1, \ldots, 49 \qquad (13)$$

where β_{jt} is the average of the rolling 12 month beta value for fund j during year t and, for the total period fee ratios,

$$FEE_j = \gamma_0 + \gamma_1 \beta_j \qquad j=1, \ldots, 49 \qquad (14)$$

where β_j is the average of the rolling 12 month beta value for fund j during the 11 year simulation period.

D. Fund Sample

The incentive fee simulations are based on a sample of 49 mutual funds which had complete monthly returns data over the period from January

1960 through December 1971.

The sample was not chosen randomly, but chosen selectively to reflect a wide range of investment objectives and policies. The sample contains funds with beta values during the 12 year period ranging from 0.10 to 1.50, with an average value of 0.92. The distribution of investment objectives for the sample (using the 1969 Weisenberger [ ] objective classifications) show that eight of the funds had maximum capital gain objectives, 19 had growth, 14 had growth and income and 8 had income objectives. The net assets of the funds ranged from a few million dollars to a few billion dollars. As discussed in Part I, only two of the funds actually used a performance fee for at least part of the 12 year test period, namely the Oppenheimer fund and the Windsor Fund.

While the majority of the sample is composed of common stock or balanced funds, three bond funds were also included. (Keystone B1, B2, and B4). This was done to broaden the range of beta values contained in the sample. The hope was that fee characteristics resulting from differences in fund risk would appear more distinctly in comparative analyses among funds. Their inclusion in the sample can be questioned however, since the performance standard does not include long term bonds. Recognizing this problem, the results for the 46 fund subsample (which excludes the bond funds) will be presented as well (in footnotes) whenever significant differences occur.

E. Simulation Results

The empirical results are organized as follows: (1) individual fund results for Plans (1) and (2) (See tables 2.2, 2.3); (2) fee ratio summary results for both plans and difference between plans (figures 2.3, 2.4, 2.5 and tables 2.4, 2.6 & 2.7); (3) fee ratio standard deviation summary results for

both plans (figures 2.6, 2.7 and 2.8 and tables 2.5 and 2.6).

(1) Individual fund results

The total simulated advisory compensation for the 49 funds during the eleven year test period was 18.89 million dollars under fee Plan 1, and 19.52 million for Plan 2. Of these amounts 18.84 million resulted from the basic fee component. Thus, on average, incentive compensation was a small part of the total, amounting to 0.06 and 0.69 million dollars for fee Plans 1 and 2 respectively. Total Plan 1 compensation (see table 2.2) ranged from a high of 96.6 million for the largest fund (Massachusetts Investors Trust) to a low of 0.57 million for the smallest fund (Keystone B.2). While the impact of Plan 1 for the fund group as a whole was small, this is not the case for individual funds. The incentive fee compensation ranged from a maximum of 4.4 million (Chemical Fund) to a penalty of 15.5 million (Wellington Fund). Total Plan 2 compensation (see table 2.3) ranged from 98.8 million for the largest to 0.67 million for the smallest fund. Incentive compensation ranged from 5.0 million (Affiliated Fund) to a penalty of 7.0 million (Wellington Fund).

(2) Fee ratio summary results

Under Plan 1, the average fund had a performance fee ratio of -0.62 percent (see table 2.4). Thus, for the average fund the use of fee Plan 1 would have slightly reduced the amount of compensation received relative to the base fee. The 28 funds with betas less than 1.0 (the low beta sub-sample) had an average total fee ratio of -2.82 percent. The 21 funds with betas greater than 1.0 (the high beta sub-sample) had a value of 2.31 percent. Of the low beta funds, only eight had positive fee ratios compared to 17 of the high beta funds. Thus, as predicted, fee Plan 1 appears to discriminate

against the lower beta funds.

The bias is confirmed by the regression of fee ratios on fund betas. For the overall sample, the slope of the regression line is equal to 11.19, with a t statistic of 2.95, indicating a significant positive relationship. The relationship is even stronger for the low beta sub-sample (γ_1 = 23.76 percent, $t_{\gamma 1}$ = 4.14), but of the wrong sign for the high beta sub-sample (γ_1 = -21.47 percent $t_{\gamma 1}$ = -2.06). Examination of the fee ratio scattergram for Plan 1 partially explains this result (see figure 2.3). There are two funds with substantial beta values and low fee ratios. These observations tend to exaggerate the magnitude of the negative correlation. The exclusion of these observations results in a regression coefficient which is much closer to zero.[19/] The lack of a significant positive relationship between fee ratios and betas for the high risk sub-sample is due at least in part to the high residual variation of these funds, which tends to obscure the underlying relationship.

The results for Plan 1 lose a good deal of their statistical significance when the three bond funds are removed. The relationship between the total fee ratio and beta for the 46 funds is not significant at the 5 percent level.[20/] The significance of the relationship for the 25 low beta funds remains high though it too declines.[21/] These results are in part to be expected, since removal of the bond funds substantially reduces the range of beta values in the sample. Thus, the regression lines are more susceptible to residual variation in the fund returns.[22/]

The averages for Plan 2 present a more consistent pattern across the range of beta values. The total fee ratio for the total sample was 3.32 percent compared with 3.51 percent and 3.07 percent for the low and high beta

sub-samples respectively. 21 of the 28 low beta funds (75 percent) had positive fee ratios compared with 16 of the 21 (76 percent) of the high beta funds. Thus, Plan 2 appears to be free of the bias inherent in Plan 1. The lack of a significant correlation with beta is shown by the regression of fee ratios versus beta; the regression line slope (γ_1) for the total sample equals -0.16 percent, with a t value of -0.04. For the low beta sub-sample a positive relationship remains, but it is not significant at the 5 percent level. For the high beta sub-sample the relationship is negative, but insignificant at the 5 percent level. When the two outliers discussed above are removed, this negative slope is substantially reduced.[23/] The three bond funds had fee ratios consistent with the stock funds (-5.3, 2.6 and 7.1 for Keystone B1, B2 and B4 respectively) and their exclusion from the sample has no significant effect on the Plan 2 results.[24/]

An unpredicted result is the overall average fee ratio of 3.3 percent for Plan 2, given the CAPM prediction of zero. The result is due to an average superior risk adjusted performance of the funds during the test period. The average excess return earned by the funds (before adjusting the standard for expenses) was 1.2 percent per year. The excess return resulted, on average, in positive incentive compensation being earned by the advisers. The fact that under Plan 1 the average fee ratio was negative (-0.62 percent) despite the superior risk adjusted performance reflects the fact that well over half the funds (57 percent) have betas less than 1; and Plan 1 tends to discriminate against low beta funds.

Our hypothesis that in shifting from Plan 1 to Plan 2 should increase the fee ratios for low beta funds and decrease them for high beta funds is partially confirmed in figure 2.5. The figure shows the scattergram of differences in fee ratios between fee Plans 1 and 2 versus beta. The slope of the relationship is -11.34 percent, with a t statistic of -10.35.

The fee ratios for the low beta sample increased on average by 6.32 percentage points. The average difference (designated residual in table 2.6) is significantly different from zero at the 5 percent level of confidence (t statistic for mean - 7.87). 27 of the 28 funds had increased fee ratios under Plan 2. The differences range from a reduction of -0.39 to a gain of 17.92 percentage points. Thus Plan 2 is almost unanimously preferable to Plan 1 for the low beta funds.

Curiously enough, the average fee ratio for the high beta funds is slightly higher under Plan 2 as well. The average increased by 0.75 percent, with individual values ranging from a 3.35 percent reduction to a 4.00 percent increase. The mean difference however is not significantly different from zero at the 5 percent level (t ratio for mean - 1.77). Fourteen of the high beta funds showed increases, 7 decreases. Thus, the shift to Plan 2 had a much less well defined effect for thi high beta funds. We will return to this result below when the year by year results are discussed.

The changes in the annual fee ratios resulting from a shift from Plan 1 to 2 present a picture consistent with the theory. For the low beta funds the fee ratios were predicted to increase in years with positive market returns, and decrease in years with negative returns. The predictions are

reversed for the high beta subsample. The year by year results are presented in table 2.7. The changes in fee ratios were in the direction predicted for the low beta funds in 10 of 11 years, the exception (1969) being a year when the average of the 12 month market returns was close to zero. For the high beta funds, the changes were consistent with the predictions in 9 out of 11 years, the exceptions (1967 and 1969) being relatively minor in nature.

The annual results help explain why the average of the 11 year fee ratios increased for the high beta funds. When the 11 annual fee ratios are averaged, the average annual fee ratio declines, as predicted, by 0.04 percent (see table 2.7). The 11 year fee ratios, however, give more weight to changes in the later years of the simulation period when the fund net asset values are larger. One year in particular contributes substantially to the result -- 1970. The average market return was at its lowest value during the 11 year test period in 1970. Under Plan 1, the average 1970 fee ratio was -19.7 percent. Thus, the typical high beta fund adviser would have lost 20 percent of his basic fee in performance penalties. Under Plan 2 this loss was cut in half, with an average fee ratio of -9.7 percent. This large gain, particularly in a later year when fund assets were larger, offset many of the smaller reductions in earlier years.

When the annual fee ratios are regressed on the annual beta values (see equation 13), the slopes of the Plan 1 regression lines range from a high of 57.4 percent (1967) to a low of -58.7 percent (1962). The t statistics for the slopes show the relationships to be significant at the 5 percent level in 9 out of 11 years. The sign of the relationship tends to be in the direction of the market, as predicted by the theory (exceptions are 1963,

1966 and 1969). For Plan 2, the sensitivity of the results to fund betas is substantially reduced. The average absolute value of the estimated regression slopes is 32.1 for Plan 1, and 21.9 for Plan 2. Under Plan 2 the average absolute value of the t statistics for the slopes was reduced from 5.2 to 3.3. The slopes of the regression lines for Plan 1 exceed the Plan 2 values (in absolute terms) in all but three years (1963, 1966 and 1970). Thus, Plan 2 substantially reduced the dependence of advisory compensation on beta and market return.

(3) Fee Ratio Standard Deviation Summary Results

The average fee ratio standard deviation for Plan 1 is 22.8 percent. As predicted the average for the high beta funds was substantially greater than for the low beta funds (30.9 and 16.7 percent respectively). The shape of the fee ratio standard deviation versus beta scattergram (see figure 2.6) is in line with the predicted shape (see figure 2.2). The fee ratio standard deviations decline with increasing beta for betas less than 1, and rise sharply for beta values greater than 1. When the three bond funds are eliminated, the negative slope for the low beta funds is substantially reduced.[25] For Plan 2 the averages are smaller, equalling 20.50, 29.21 and 13.96 percent for the total sample and high and low beta subsamples respectively. The relationship between the fee ratio standard deviations and beta is almost flat for betas less than 1, and rising for betas greater than 1, but less sharply than for Plan 1 ($\hat{\gamma}_1$ = 37.50 and 24.09 for the high beta subsamples for Plans 1 and 2 respectively). When the bond funds are deleted, the standard deviations increase over the low beta range as well.[26]

Figure 2.8 shows the distribution of differences between Plans 1

and 2. The result is roughly in line with the predictions; 31 of the 49 funds have lower fee ratio standard deviations under Plan 2, including 10 of the low beta funds and 8 of the high beta funds. As predicted, the funds with the highest and lowest beta values have the largest decreases. The slope of the regression line of the differences versus beta is equal to 17.35 and -13.41 percent for the low and high beta subsamples, both coefficients significant at the 5 percent confidence level.

F. Summary

Our findings in Part II can be summarized as follows:

1. For the 49 funds as a group, fee Plan 1 made little impact on the total amount of compensation received. During the 11 year period the total advisory compensation received was 18.84 million dollars, of which only 0.06 million resulted from performance compensation. The average 11 year fee ratio (Performance Fee/Basic Fee) was -0.62 percent, thus, the average fund registered a performance penalty of 0.6 percent of its basic fee. While the group effect was small, the impact on the amount of compensation received from individual funds varied substantially among funds. Performance fee ratios ranged from a high of 18 percent to a low -26 percent. The tendency was for the low beta funds to have lower fee ratios. The average fee ratio for funds with beta values less than 1.0 was -2.8 percent, compared with 2.3 percent for funds with betas exceeding 1. 20 of the 28 low beta funds had negative fee ratios, as opposed to only 4 of the 21 high beta funds. Thus, while Plan 1 had little aggregate effect, its results for individual funds were biased against those with lower betas.

2. The positive relationship between total fee ratio and beta previously observed for Plan 1 is confirmed by regression analysis. On average, a 1 unit increase in fund beta is associated with a 11.2 percent increase in fee ratio. Differences in beta values account for about 16 percent of the total variation in fee ratios. The relationship is much stronger for the low beta funds. Here, beta differences account for 40 percent of the variation in fee ratios. A 1 unit beta increase is associated with a 23.7 percent increase in total fee ratio. For the high beta funds the picture is not as clear. For these 21 funds, total fee ratio actually declined with increased beta. However, the negative correlation is largely due to the influence of two "outlier" funds with high betas and very low fee ratios. When these are removed from the sample, the correlation between fee ratio and beta for the high beta funds is insignificantly different from zero. The lack of the positive correlation predicted by the theory is due, at least in part, to the lower degree of diversification of the high beta funds. Thus, the predicted relationship is obscured by the non-market related residual variation in fund returns.

3. Shifting from Plan 1 to 2 had several effects. First, the average incentive compensation increased to 0.69 million dollars. Second, the average 11 year fee ratio increased by 3.9 to 3.3 percent. Third, the bias against the low beta funds was removed. The average fee ratio for the low beta funds increased by 6.3 to 3.5 percent, 27 of the 28 funds showing increases. Surprisingly, even the high beta group showed a small increase, with the average 11 year fee ratio increasing by 0.75 to 3.1 percent. The result is counter-intuitive, since the theory predicted that risk adjustment would reduce

the compensation paid by the high beta funds. As discussed, however, the result is due to the fee gains in the down markets in later years (e.g. 1970) when the asset base was larger outweighing the effect on the 11 year fee ratios of the earlier and more numerous fee reductions in up markets. The average of the 11 year by year fee ratios (which is not as influenced by the asset growth during the simulation period) declined as predicted, but by a small and statistically insignificant amount.

4. The removal of the beta bias is confirmed by the fee ratio versus beta regression analysis. For the total sample the correlation between fee ratios and beta is close to zero. For the low beta funds there is a small but statistically insignificant positive corresltation. The correlation for the high beta funds is negative, again resulting from the two "outlier funds." When these are removed the correlation is insignificantly different from zero. Thus, the use of the risk adjusted measure of performance appears to have successfully removed the beta bias against low beta funds implicit in the current practice type of incentive fee arrangements. The impact of risk adjustment on the high beta funds is inconsistent, the average change in fee ratios not being significantly different from zero.

5. The use of incentive fee plans resulted in substantial year to year variability in advisory compensation. Under Plan 1 the average fee ratio standard deviation was 23 percent. Thus, as a rule of thumb, two thirds of the annual fee ratios lay in the range from -23 percent to 23 percent, 95 percent between -46 percent to 46 percent. The average for the high beta funds was 30.9 percent, much larger than the 16.7 percent average for the low beta funds. Thus, as predicted, high beta funds had substantially

larger fee ratio variations, resulting primarily from less diversification. The use of Plan 2 removes the smaller performance measurement component of fee variation, leaving the residual component. Average fee ratio standard deviations declined 2.3 percentage points for the 49 fund sample. The reduction was largest for the lower beta funds, 2.7 percent compared with 1.7 percent for the higher beta funds.

6. The relationship between fee ratio standard deviation and beta differs markedly for the low and high beta funds. Under Plan 1 the standard deviation decreases with increasing beta for beta values less than 1, and rises sharply for values greater than 1.0. For plan 2, the relationship is reasonably flat for beta values less than 1, and rising for values greater than 1, but less sharply than in the case of Plan 1. A one unit increase in beta for the high beta funds is associated with increases in standard deviation of 37.5 and 24.1 percentage points under Plans 1 and 2 respectively.

III. SENSITIVITY ANALYSIS

The purpose of Part III is to test the sensitivity of the compensation that would have been received under Plans 1 and 2 to changes in the way in which investment performance is measured.

We have selected five aspects of the performance measures used in Part II for further study. These are:

A. The magnitude of expenses assigned to the comparison standards

B. The use of fiscal year-end performance measurement and fee computation as opposed to the Part II rolling month-by-month calculations

C. The choice of market indices other than the Standard and Poor's 500 Index

D. The use of performance "null zones" based on the level of statistical significance of the funds excess returns

E. The use of performance measurement horizons longer than the 12-month period used in Part II.

The analyses were conducted by making the appropriate changes in the two incentive-fee plans and repeating the Part II calculations. In total, nine simulation cases were run -- one for each change in the performance measure examined. The nine alternatives are described in Table 3-1. In each replication, only one change was made from the basic fee plans of Part II so that the effect could be isolated.

Part III is organized into five sections, one for each of the above topics. The simulation results are summarized in the text, and presented in

detail in Tables 3-3 through 3-6. Tables 3-3 and 3-4 present summary statistics for the fee ratio changes, and tables 3-5 and 3-6 the fee ratio standard deviation changes. The analytical results of Part II are extended in Appendix B to include the various changes considered. These analyses permit prediction to be made for comparison with the simulation results.

The impact of the performance measurement changes for each plan is measured by the difference in the fee ratios and fee ratio standard deviations between the modified or alternative plan, and the base plans as used in Part II. The fee ratio differences (designated residuals) for each fund are given by

$$RES_1^k = FEE_A^k - FEE_B^k \tag{15}$$

where FEE_A^k and FEE_B^k are the plan k (k = 1, 2) 11-year fee ratios for the alternative case (A) and the base case (B). The fee ratio standard deviation residuals are given by

$$RES_2^k = FSD_A^k - FSD_B^k \tag{16}$$

where FSD_A^k and FSD_B^k are the Plan 1 and 2 fee ratio standard deviations for the alternative and base cases.

The format of each of the tables 3-3 through 3-6 is the same: Column (1) gives the mean residual for the 49-fund sample; column (2), the standard deviation of the residuals; column (3), the t statistic for the mean residual (mean residual/standard error of mean); columns (4) and (5), the minimum and maximum residual values; column (6), the number

of funds with positive residuals; column (7) summarizes the regression equation between the residuals and the 12-year average fund betas. The column entries include the sign of the correlation coefficient (+ or -), an asterisk (*) if the regression coefficient was significant at the 5 percent level, and the regression R^2. The results are presented for the total 49-fund sample as well as for the 21-fund high and 28-fund low beta subsamples used in Part II.

A. Operating Expense Tests -- Cases 1 and 2

At the present time there is no precedent for reducing the return on the comparison standard to reflect a reasonable level of fund operating expenses. As discussed in Part II, the failure to so adjust the standard results in a performance measure which is biased against the fund adviser. In our Part II simulations we allocated certain expenses to the comparison standards for each of the 49-sample funds. We now examine the sensitivity of these results to changes in the values of the allocated expenses. In sensitivity analysis case 1 we examine the incentive fee changes resulting from omission of the expense adjustment (i.e. current practice). In case 2 we examine the impact of doubling the assigned factors. While there may be some question regarding the appropriateness of the so-called "normal" expense levels used in Part II, the doubled values would generally be considered as upper bounds. The cost parameters for the Part II calculations and the two sensitivity cases are summarized in Table 3-2.

For Plan 1 the omission of the expense adjustment will raise the return on the comparison standard by 0.25 to 0.35 percent per year depend-

ing on the size of the fund being evaluated. Given the scaling factor δ is approximately equal to 4.0, the average fee ratio is expected to decrease by 1.20 percent. Doubling the expense ratio should produce a corresponding change in the opposite direction. The fee ratio changes should not depend on fund beta values, and fee ratio volatility should remain unchanged.

For Plan 2 the situation is somewhat more complicated. Funds with beta values less than 0.97 have comparison standards with sufficient liquid assets (i.e. at least 3 percent treasury bills) that the expense ratio will be unaffected by higher borrowing costs. For these funds the average fee ratio should change by $\mp$ 1.12 percent for Cases 1 and 2 respectively. For funds with beta values greater than 1.0 the predicted changes are the same as for Plan 1.

Results

The amount of performance fee compensation that would have been paid under plans 1 and 2 is extremely sensitive to the magnitude of the expense ratio assigned to the comparison standard. The results were in the direction predicted and approximately equal to the predicted magnitude for every fund. For plan 1, the average fee ratio using the Part II "normal" expenses was a deficit of 0.62. When the expense ratio is eliminated (case 1), the deficit triples to 1.73. When the fee ratio is doubled, the deficit changes to an average payment of 0.82 percent of the basic fees received. For plan 2, the average fee ratios are similarly sensitive to the fee ratio assumed, ranging from 2.15 (zero expenses) to 3.32 (normal expenses) to 4.80 (double expenses) percent of the basic fee.

B. Fiscal Year-End Plans -- Case 3

Over half of the funds in the SEC survey [ ] used fiscal year-end as opposed to rolling monthly or quarterly performance calculation. For these plans the annual incentive fee would thus be based on a single year end measure of performance, rather than twelve month-by-month measures. As shown in Appendix B, this should tend to result in slightly higher average fee ratios during the 12-year period,[27] coupled with very substantial increases in fee ratio standard deviations.

Results

The use of fiscal year as opposed to rolling monthly performance measurement resulted in more compensation for 63 percent of the sample funds under plan 1 and 75 percent under plan 2. Average plan 1 fee ratios increased from -0.62 to -0.07 percent of basic fee compensation. For plan 2, the average fee ratio increased from 3.32 to 4.84 percent. At the same time, the compensation for every fund under plans 1 and 2 became more volatile, the average increase in the fee ratio standard deviations equaling 40 percent of the base case values.

C. Alternative Index Tests -- cases 4, 5 and 6

65 of 103 plans included in the SEC 1972 Survey [ ] used the Standard and Poor's 500 Stock Composite Index, 14 used the NYSE composite, and ten the Dow Jones 30 Industrials. However, almost none of the advisers adjusted the index return to include dividend distributions. To examine the impact of omitting dividends on the index, we have selected the S & P 500 Index without dividend adjustment as the first alternative index.[28] For the second and third alternatives we have selected a substantially less volatile index (The Dow Jones 30 Stock Industrial) and a more volatile

index (an unweighted index of all NYSE stocks).

Results

These tests point up the implications for advisory compensation of the use of inappropriate indices.

The Standard and Poor 500 without dividends is inappropriate since it excludes the dividend component of index return (approximately 3.5 percent per year during the simulation period). The use of this index resulted in an average increase in performance compensation of 12.2 percent of the base fee for plan 1, with every fund having increased compensation. Under plan 2, the average increase was 11.3 percent, with the higher beta funds increasing the most. Fee ratio standard deviations were not significantly affected for either plan.

The Dow Jones 30 Stock Industrial Average does not reflect the composition of the equities market. If is made up of less risky stocks which are expected to have lower than average realized returns. Thus, the Dow Jones 30 will tend to be an "easier" plan 1 standard than the S & P 500. This prediction was confirmed by the simulation results. For plan 1, every fund had increased compensation, the average fee ratio increasing by 5.71 percent. The Dow, during the 12-year simulation period, also turned out to be an easier standard on a risk-adjusted basis (on a risk-adjusted basis, the Dow had a negative alpha of 0.11 percent per month relative to the S & P 500). For plan 2, 40 of 49 sample funds had increased fees, with an average fee ratio increase of 2.52.

The unweighted NYSE Index is also unrepresentative of the typical mutual fund portfolio. Since it gives disproportionate weight to the

smaller and typically more risky NYSE stocks, it will on the average tend to have higher realized returns. Thus, it will be a more difficult plan 1 standard. This prediction is confirmed by the decreased compensation of almost every sample fund, the average fee ratio decreasing by 9.5 percent. The unweighted NYSE index also turned out to be a more difficult standard on a risk-adjusted basis as well. (The unweighted NYSE had a positive alpha of 0.10 percent per month relative to the S & P 500). Forty-seven funds had lower plan 2 compensation with the NYSE Index, the average fee ratio decline equalling 6.3 percent.

D. Null Zone Tests -- Cases 7 and 8

A substantial portion of existing incentive fee plans incorporate a "null zone" which prohibits performance fee payments or penalties for return differentials between the null zone limits.[29] For example, a $\pm$ 5 percentage point null zone would eliminate incentive fee adjustments for 12-month return differentials between -5 and 5 percent. The purpose of the null zone is to prohibit payments or penalties for return differentials which are not "significantly different from zero."

The SEC, in Investment Advisers Act Release number 315 [ ], while apparently supporting the null zone concept, focussed almost entirely on the conditions under which the maximum fee could be paid.[30]

> As a matter of elementary fairness the performance differences from which the maximum fee adjustment results should be set so as to preclude such maximum fee adjustment resulting from insignificant or random differences. Through a statistical analysis of the performance of the investment company relative to the performance of the index throughout the year, it is possible to determine whether or not the investment performance of the investment company differs significantly from the investment record of the index. Ideally, under any particular performance fee contract there should be at least a 90 percent probability that the maximum fee adjustment will not result from random fluctuations in performance.

The Commission further suggested that preliminary studies indicated that ± 10 percentage point interval would be sufficient "as a rule of thumb" to provide the required confidence level. It was further suggested that these limits could be reduced for large, well diversified investment companies.[31] The SEC also proposed the use of a "t" statistic to determine the degree of statistical significance associated with a given return differential (see Appendix B for a description).

Concerning the null zone itself, the Commission appears to be recommending a similar type of confidence requirement, but at a lower level of significance than for the maximum fee payment.[32]

> Of course, similar considerations are required for fee adjustemnts that are less than the maximum. In other words, meaningful fee adjustments may occur at levels which are less than the maximum and therefore, like maximum adjustments, they should be based upon significant performance differences. (The level of confidence that such lesser fee adjustments are based upon meaningful performance differences may be less than 90 percent.) This may be accomplished by the use of null zones of appropriate size or of a fee structure under which the effect of small performance differences is not proportionally greater than the effect of large performance differences.

Thus, the Commission appears to be suggesting a two tier significance test -- a lower level of confidence for any incentive fee payment or penalty, and a higher level for the maximum adjustment. This type of rule has inherent complexities which have not been dealt with in the Release. For example, suppose the plan 1 performance differential exceeds the 18 percent maximum premium limit, but the differential was only different from zero of the 60 percent level; what proportion of the maximum fee could be collected? Or, if a 1 percent differential was significant at the 90 percent level, could the maximum fee be paid? The Release appears to be mixing two issues -- the determination of significance and, the size of the return differentail required before the maximum fee is paid. In our minds, these are separate questions.

In simulation cases 7 and 8 we have added null zone features to

the two basic plans. These prohibit incentive fee payments or penalties during any month in which the 12-month return differential is not significantly different from zero at a specified level of statistical significance. The confidence intervals are measured in terms of the variation in the month-to-month differential returns during the performance measurement horizon. A 12-month differential ($R_{pt} - R_{st}$) is considered to be statistically different from zero if and only if the mean monthly return differential exceeds some number (T_{MIN}) of standard deviations of the mean. The confidence levels used were the 60%($T_{MIN} = 1.0$) and the 85%($T_{MIN} = 1.6$) levels. The test statistic, designated t_{α}, is equal to the ratio of the mean monthly differential return to the standard deviation of the mean. Thus, performance payments or penalties exist only for months in which the absolute value of t_{α} exceeds T_{MIN}, and then take place in the usual manner prescribed in part II.

The analyses in appendix B indicate that the plan 1 t test is biased in favor of higher risk funds. For periods with positive market risk premiums, the analysis demonstrates that funds with betas greater than 1 will tend to have positive t statistics, and conversely for funds with betas less than 1.0. The same type of bias applies equally to any plan 1 null zone which is symmetric about zero. For plan 2 the t test and symmetric null zones give unbiased results because the comparison index has the same volatility as the fund. Thus, only for plan 2 will funds of various beta values be treated in a consistent manner.

Our analysis also shows that the null zones sizes

for both plans are very sensitive to fund beta values. Thus, it would be impossible to specify a fixed null zone for all funds (eg. ±10%), even as a rule of thumb. Further, the simulations show that for a given beta value, the null zones sizes will change substantially over time. This is illustrated in table A.1 of Appendix A, where the t statistics associated with given levels of the mean return differentials change substantially over the three years of simulation results shown (see columns 7 and 8).

Results

The effect of using null zones based on the standard error of the mean monthly excess returns were most significant for the lower beta funds. For plan 1, the requirement of a minumum test statistic of 1.0 virtually eliminated the average fee ratio penalty paid by the low beta funds. The result for the high beta funds was much less consistent. While the fee ratios of individual funds were substantially changed, the average reduction in fee ratio was small and not statistically significant. Under plan 2, the average fee ratio for the low beta funds were reduced by approximately one-third of the base case value for $T_{MIN} = 1.0$, and by two-thirds for $T_{MIN} = 1.6$. The average for the high beta funds was reduced by about one third for $T_{MIN} = 1.0$, and was not significantly affected by the further increased in T_{MIN} to 1.6. Thus, the null zones appeared to have the greatest impact on the incentive compensation of the lower beta funds, leaving that of the higher beta funds more or less intact.

E. 36-Month Performance Horizon Tests -- Case 9

A majority of the funds in the SEC Survey [ ] (93 out of 103) use a 1-year performance measurement horizon. Of the remainder, over half (6 out of 10) used a 36-month horizon. In case 9 we examine the impact on advisory compensation of shifting from a 12 to 36-month perform-

ance measurement horizon. The monthly incentive fee is based on the return differential over the previous 36 months, as applied to the 36-month average asset base. The simulation results are based on the 1963-1971 period (as opposed to the usual 1961-1971 period) since two additional years were required to initialize the 36-month fee plans. For comparison, the base case fee results were computed for the same time period.

As shown in Appendix B, the 36-month horizon is predicted to increase the beta bias in compensation levels; that is, compensation for the low beta funds will be further decreased, and increased for the higher beta funds. The change results from the current practice of not annualizing the 36-month performance differential prior to making the incentive fee calculation. The longer horizon is predicted to have no effect on the average plan 2 fee ratios. The fee ratio standard deviation for both plans 1 and 2 are predicted to increase substantially under the longer performance measurement horizon.

Results

For plan 1, the 36-month horizon increased the correlation between fee ratios and beta, thus increasing the beta bias in incentive fee payments. Average fee ratios increased for the higher beta funds and decreased for the lower beta funds. The beta bias was most pronounced within the low beta subsample, having been weakened for the higher beta funds by the larger proportion of non-market-related variation in fund returns. Under plan 2, there was no significant impact on the average incentive fee compensation resulting from the longer horizon. For both plans, fee ratio volatility increased by a factor of 1.5 to 1.6 for the longer horizon.

IV. Conclusions and Recommendations

Our conclusions can be organized into two parts, which we shall designate as technical and substantive. The first deals with the mechanical aspects of fee plan design, the second deals with the central issue of choice of an appropriate index. The technical conclusions follow largely from our Part III findings, and will be discussed in the order of the topics of that section

A. Technical Conclusions

1. Expense Ratios

The performance comparison between a fund and its comparison index will be meaningful only if the index represents a viable investment alternative to the fund. The standard should not represent a theoretical and unobtainable target but an alternative in which the fund assets could have been invested.

When fund return net of expenses is compared directly with the index, the result is biased against the fund since the index portfolio is assumed to operate costlessly. The index return should be reduced by an amount which reflects a reasonable level of operating costs. Conversely, this amount could be added back to the fund return before comparing it with the index.

It should be carefully noted that we are concerned only with the operating component and not with the advisory fee portion of total fund expenses. Since the comparison portfolio is mechanically revised to follow the composition of an index (such as the S & P 500 stock composite index) no advisory fee is required, nor any brokerage fees resulting from implementing

portfolio strategies. The expenses which are relevant are administrative (shareholder record keeping etc.), liquidity enpenses (i.e. maintaining a certain parcentage of net assets in liquid form) and the brokerage costs of investing net cash flows to the fund. To the extent that the latter cost is covered by a sales charge or entrance fee, it would be eliminated from consideration along with the advisory fee and portfolio brokerage.

The obvious question relates to what is a reasonable level of expenses, and who should decide what is reasonable. The question is complicated by the wide variety of fund sizes and types. One suggestion would be to have the SEC propose a set of guidelines parameterized by fund size and type. A second and perhaps preferable suggestion would permit independent fund directors to prescribe the appropriate adjustment to the fund standard. This would amount to partitioning the fund's total expense ratio into advisory and operating related components, and allocating the later to the index. This method would permit the maximum degree of flexibility in tailoring comparison index expense ratios.

2. Fiscal Year Horizons

The use of the fixcal year method has two consequences. First, it reduces the lag in performance fee payment, since the fee is based on the average assets during the previous twelve months rather than the previous twenty-four months as in the case of the rolling twelve month plan. If assets are increasing (decreasing) the annual fee ratios will tend to be slightly larger (smaller) in the fiscal year case. (Any gain to the adviser, however, is at least partially offset by delays in receiving payment under this option

-- see footnote 27.) The primary effect of the fiscal year-end method is a substantial increase in fee ratio volatility. In our simulations, volatility was increased by 40 percent on average over the rolling 12-month fee plans. Thus, while we would not recommend abolition of this option, we really see very little to recommend it.

3. Performance Fee Null Zones

The construction of a meaningful null zone is not a simple matter. Its size depends on the beta of the fund, the index used for performance measurement and the market conditions during the evaluation period.

When a symmetric null zone centered on zero is used, it will have an unbiased effect only for situations where the index has the same volatility as the fund. When an inappropriate index is used, the null zone will be biased in favor of higher beta funds, and against lower beta funds. There is no easy solution to this plan 1 type beta bias, other than selecting an index of the same volatility as the fund (see Section IVB below).

Our results further indicate that the size of the null zone associated with a specified degree of statistical confidence depends on several factors -- the degree of fund diversification, market conditions during the performance measurement horizon, and, in the case of plan 1, beta. Thus, any attempt to prescribe fixed null zones for all funds, or even for particular funds over time, would not be useful, even as a rule of thumb.

Since the purpose of the null zone is to prohibit incentive fee payments or penalties for return differentials which are not "significantly different from zero," it would seem appropriate to base the null zone sizes on the statistical properties of the subperiod return differentials during the per-

formance horizon. In the case of the rolling fee plans, this approach would provide a continually updated null zone tailored specifically to the fund and time period being considered.

4. Performance Measurement Horizon

Under existing incentive fee regulation there appears to be no requirement to coordinate the length of the performance measurement horizon with the other parameters of the plan, specifically the limits for which the maximum fee is paid and the rate of incentive fee payment per percent return differential (i.e. δ_1 -- see equation 11). For example, incentive fee plans with 1, 2 or 3 year horizons could have the same $\pm$ 10 percent limits for maximum fee payments, and the same 0.022 percent incentive fee rate.

Extending the horizon, while keeping the other parameters the same, increases the magnitude of the plan 1 beta bias in incentive compensation. This follows because the slope of the relationship between expected fee ratios and beta is proportional to the expected market risk premium during the performance measurement period; increasing the horizon increases the expected risk premium, and thus increases the slope.

Two solutions are available to eliminate this effect. The first would increase the limits for the maximum fee payment to correspond with the longer norizon, and reduce the incentive fee rate for a 1 percent return differential (i.e. reduce δ). For example, the limits for the maximum fee payment would be increased from 18 to 54 percent for the 36-month version of plans 1 and 2, and the incentive fee rate reduced from 0.022 percent to 0.007 percent per percentage point differential. The second solution is to annaulize the return differentials for horizons for longer than one year. For example,

a 12 percent three-year differential would be annualized to a four percent difference before the incentive fee is computed. This method is preferable since it facilitates investor comparisons among fee plans using different performance measurement horizons.

Even on an annualized basis, however, the longer horizon fee plans still benefit from the beta bias, since the probability that the annualized market return will be positive increases with the length of the horizon. Thus, annualizing the differential will mute, but not eliminate, the impact of the beta bias.

The shift to plan 2 largely eliminated the beta bias in incentive compensation. The changes in fee ratios for the 49 funds resulting from the shift to the 36-month horizon were not significantly correlated with beta. However, the failure to annualize the return differentials resulted in substantially higher fee ratio volatility under plan 2 as well as plan 1.

Thus, if performance fees with horizons longer than one year are used, it would appear appropriate to annualize the return differential prior to making the incentive fee calculation. This will reduce, but not eliminate, the plan 1 beta bias, and will reduce the fee ratio volatility under the longer horizon alternatives to levels comparable to the twelve month plans.

B. Substantive Conclusions: Choice of An Appropriated Index

Our Part II results clearly indicate that any incentive fee plan based on performance measures against an index of different volatility than the fund being evaluated have a beta vias. In years with up markets the bias favors the high beta funds, that is, funds with beta values greater than the index tend to have positive incentive compensation, and funds with beta values less than the index negative incentive fees. In years with down markets the opposite effect occurs. Since up markets tend to outweigh the down markets historically, and since investors typically expect the market to rise, existing fee schemes are biased against low risk funds. This fact has not been lost on the investment advisory fraternity. A majority of the funds in the SEC 1972 [ ] Incentive Fee Survey have beta values greater than 1.0.[33]

The beta bias leads to two results:

(i) elimination of incentive fee options for the managers of low risk funds (eg. income and balanced funds.)

(ii) Creation of an incentive for the advisory to increase the volatility of his fund in order to increase his expected compensation level.

The use of the beta adjusted index would seem to eliminate both of these problems. The Part II results showed a zero correlation between fee ratios and beta when the risk adjusted Plan 2 was used. The use of Plan 2 also resulted in lower fee ratio volatility, especially for the lower beta funds. Thus, the use of the market line beta adjustment would seem to be a step in the right direction, particularly for the lower beta funds.

C. Directions for Further Research

Our analysis of incentive fees has been based on two measures of performance -- a non-risk adjusted comparison with the market index (Plan 1) and the Capital Asset Pricing Model, market line risk adjusted performance measures (Plan 2). The results showed the CAPM standard to be preferable to the non-risk adjusted performance standard.

Recently, however, a number of empirical studies (e.g. Friend and Blume [ ], Black, Jensen and Scholes[ ], Fama and MacBeth [ ]) have indicated that the average return on securities has tended to deviate systematically from the predictions of the CAPM. Though the observed risk-return relationship appears to be linear, the slope of the line (the price of risk) has, in general, been less than predicted by the CAPM. In short, the evidence suggests that the ex post market line may not provide the best set of bench marks for the average risk-return relationship in the market from naively selected portfolios. Thus, it may be possible to further refine our risk-adjusted atandard to reflect the divergence between the empirically determined risk-return relationship and the CAPM market line. This examination is the subject of a further paper [ ].

Appendix A

Description of the Incentive Fee Simulator

The calculations performed by the simulation program are relatively straightforward. They can best be illustrated with the aid of an example. Table A.1 shows three years of simulated month-by-month results for Plan 2 and Keystone K1 fund. We will briefly describe each of the columns.

Columns (1) and (2): Year and month end of fee calculation.

Column (3): Month end net asset value in millions of dollars

Column (4): Fund beta during previous twelve months (β_p)

Column (5): Average monthly fund return during previous 12 months ($\bar{r}_p$)

Column (6): Average monthly return for the comparison standard during previous 12 months ($\bar{r}_s$), where

$$(\bar{r}_s) = (\bar{r}_f) + \beta_p(\bar{r}_m - \bar{r}_f) - \frac{EX}{12}$$

where $\bar{r}_m$ and $\bar{r}_f$ are the average monthly returns on market index and riskless lending rate (if $\beta_p \leq 1$) or borrowing rate (if $\beta_p > 1$) during previous 12 months. EX is the annual expense ratio for the comparison portfolio (see colume 12 for description). For plan 1, ($\bar{r}_s$) would be set equal to ($\bar{r}_m$) minus (EX/12).

Column (7): Differences between Columns (5) and (6), the average monthly excess return during previous 12 months ($\hat{\alpha}$)

Column (8): t statistic for average excess return; $t_\alpha = \hat{\alpha}/SE_\alpha$, where SE_α is the standard error of alpha.

Column (9): 12 month cummulative return for fund (R_p).

Column (10): 12 month cummulative lending (if $\beta \leq 1$) or borrowing rate (if $\beta > 1$). The lending rate based on 30 day treasury bills, the borrowing rate on the prime bank rate plus an increment which depends on the size of the fund (R_F).

Column (11): 12 month cummulative return on Standard and Poor's 500 Stock Composite Index (R_M)

Column (12): The expense ratio for the comparison portfolio for previous 12 months: sum of administrative plus brokerage fees on net cash inflow to the fund plus liquidity expenses, unpressed as a proportion of average assets during 12 month period (EX).

Column (13): 12 month cummulative return on the comparison portfolio (R_s),

$$R_s = R_F + \hat{\beta}_p(R_M - R_F) - EX.$$

For plan 1 R_s would equal $R_M - EX$.

Column (14): 12 month excess return for fund ($R_p - R_s$).

Column (15): Amount of base fee earned during current month. Based on average assets during month and computed at (1/12) of annual rate (Millions of Dollars).

Column (16): Amount of incentive fee earned during current month. Based on 12 month excess return ($R_p - R_s$) and average assets during 12 months, computed at (1/12) annual rate (Millions of Dollars).

Column (17): Total advisory compensation for the month (sum of columns 15 and 16).

TABLE A1

EXAMPLE OF MONTH BY MONTH SIMULATION CALCULATION

DETAIL REPORT FOR: KEYSTONE K-1

FEE PLAN DESCRIPTION ... (PLAN 2) ... VLT.ADJUSTED ... 12 MONTH HORIZON

DATE		ASSETS	BETA	AVERAGE RETURNS (%)				CUMMULATIVE RETURNS (%)						FEES ($ MIL)		
YR	MO	($ MIL)		FUND	COMP.	DIFF	T-RAT	FUND	FREE	MKT.	EXP.	COMP.	DIFF	BASIC	INCENT	TOTAL
64	1	94.2	0.50	0.64	0.89	-0.25	-0.58	7.71	3.20	20.04	0.33	11.28	-3.57	0.047	-0.006	0.041
64	2	97.3	0.61	0.78	1.22	-0.44	-0.92	9.56	3.25	24.79	0.33	15.97	-6.41	0.048	-0.011	0.037
64	3	100.1	0.59	0.76	1.10	-0.35	-0.72	9.24	3.31	22.32	0.28	14.30	-5.06	0.049	-0.009	0.041
64	4	100.3	0.49	0.47	0.78	-0.31	-0.72	5.59	3.37	17.37	0.28	9.89	-4.30	0.050	-0.007	0.043
64	5	102.7	0.48	0.46	0.76	-0.30	-0.70	5.49	3.41	17.03	0.28	9.66	-4.17	0.051	-0.007	0.043
64	6	105.0	0.52	0.65	0.96	-0.31	-0.64	7.89	3.44	21.38	0.28	12.43	-4.54	0.052	-0.008	0.044
64	7	103.3	0.31	1.09	0.73	0.36	1.20	13.91	3.47	23.99	0.28	9.48	4.44	0.052	0.008	0.060
64	8	107.5	0.32	1.01	0.58	0.43	1.64	12.76	3.48	16.32	0.28	7.32	5.44	0.052	0.010	0.062
64	9	110.1	0.24	1.24	0.57	0.66	2.67	15.85	3.48	20.97	0.28	7.32	8.53	0.054	0.016	0.070
64	10	110.1	0.34	1.26	0.65	0.61	3.17	16.15	3.49	18.14	0.29	8.22	7.93	0.055	0.015	0.069
64	11	111.4	0.31	1.29	0.62	0.67	3.47	16.61	3.51	18.76	0.29	7.95	8.67	0.055	0.016	0.071
64	12	112.3	0.41	1.23	0.67	0.55	2.98	15.72	3.53	16.38	0.29	8.52	7.20	0.055	0.014	0.069
MEANS ...			0.43	0.91	0.80	0.11	0.90	11.37	3.41	19.79	0.29	10.19	1.18	0.052	0.003	0.054
ST.DV ...			0.40	1.05	0.69	1.55	5.96	14.11	0.35	9.69	0.06	9.24	20.76	0.009	0.037	0.046
65	1	114.3	0.41	1.25	0.70	0.56	3.00	16.07	3.53	17.08	0.29	8.85	7.22	0.056	0.014	0.070
65	2	116.0	0.43	1.13	0.67	0.46	2.97	14.43	3.55	15.76	0.30	8.49	5.94	0.057	0.012	0.069
65	3	117.1	0.39	0.99	0.54	0.45	3.68	12.51	3.58	12.38	0.30	6.74	5.77	0.058	0.012	0.069
65	4	118.8	0.38	1.11	0.63	0.49	4.20	14.18	3.61	15.51	0.30	7.88	6.30	0.058	0.013	0.071
65	5	119.9	0.40	1.00	0.58	0.42	3.55	12.64	3.66	13.32	0.30	7.25	5.39	0.059	0.011	0.070
65	6	117.7	0.50	0.66	0.39	0.28	2.00	8.18	3.71	6.09	0.30	4.58	3.60	0.059	0.008	0.066
65	7	115.6	0.51	0.71	0.37	0.34	2.14	8.73	3.74	5.60	0.30	4.38	4.35	0.058	0.009	0.067
65	8	122.4	0.54	0.82	0.55	0.27	1.97	10.21	3.78	9.75	0.30	6.73	3.48	0.059	0.007	0.066
65	9	126.8	0.53	0.81	0.56	0.25	1.74	10.08	3.83	10.10	0.30	6.85	3.23	0.061	0.007	0.068
65	10	129.3	0.52	0.87	0.64	0.23	1.51	10.84	3.87	12.19	0.31	7.90	2.94	0.063	0.006	0.069
65	11	131.6	0.49	0.96	0.61	0.35	1.75	12.07	3.91	11.79	0.31	7.47	4.60	0.064	0.010	0.074
65	12	131.7	0.48	0.92	0.63	0.30	1.22	11.52	3.93	12.35	0.31	7.69	3.83	0.065	0.009	0.073
MEANS ...			0.47	0.94	0.57	0.36	2.48	11.79	3.73	11.83	0.30	7.07	4.72	0.060	0.010	0.069
ST.DV ...			0.19	0.58	0.34	0.35	3.21	7.81	0.47	11.77	0.01	4.56	4.57	0.009	0.008	0.008
66	1	133.3	0.48	0.85	0.52	0.34	1.40	10.59	4.01	9.28	0.31	6.25	4.34	0.065	0.010	0.075
66	2	134.4	0.49	0.78	0.45	0.32	1.35	9.61	4.08	7.50	0.31	5.44	4.17	0.066	0.010	0.075
66	3	133.4	0.52	0.66	0.44	0.22	0.90	8.08	4.13	6.73	0.31	5.18	2.90	0.066	0.007	0.072
66	4	131.4	0.51	0.55	0.38	0.17	0.64	6.70	4.20	5.33	0.31	4.47	2.24	0.065	0.005	0.070
66	5	128.6	0.53	0.33	0.18	0.15	0.54	3.89	4.27	0.45	0.31	1.93	1.96	0.064	0.005	0.068
66	6	127.7	0.51	0.49	0.33	0.17	0.62	5.97	4.33	3.90	0.31	3.80	2.18	0.063	0.005	0.068
66	7	119.0	0.51	0.21	0.21	-0.00	-0.12	2.45	4.40	1.18	0.31	2.44	0.02	0.061	0.000	0.061
66	8	117.5	0.57	-0.36	-0.27	-0.09	-0.46	-4.43	4.48	-8.68	0.31	-3.29	-1.14	0.058	-0.003	0.056
66	9	117.5	0.57	-0.52	-0.45	-0.07	-0.35	-6.27	4.57	-12.06	0.31	-5.27	-1.00	0.058	-0.002	0.056
66	10	118.3	0.52	-0.50	-0.29	-0.21	-0.86	-6.00	4.67	-10.28	0.31	-3.45	-2.55	0.058	-0.006	0.052
66	11	120.3	0.53	-0.51	-0.24	-0.26	-1.28	-6.08	4.75	-9.15	0.31	-2.96	-3.12	0.059	-0.007	0.052
66	12	122.1	0.56	-0.35	-0.32	-0.03	-0.21	-4.29	4.80	-10.05	0.31	-3.85	-0.44	0.060	-0.001	0.059
MEANS ...			0.53	0.14	0.08	0.06	0.18	1.69	4.39	-1.32	0.31	0.89	0.80	0.062	0.002	0.064
ST.DV ...			0.10	1.81	1.20	0.66	2.84	22.08	0.88	26.89	0.01	14.29	8.33	0.010	0.019	0.029
Col. #			1 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Appendix 3

APPENDIX B

Theory for Part III Sensitivity Analysis Cases

B. Fiscal Year End Fee Plans

The year τ performance fee ratio for the rolling twelve month plan is given by (see equation 11)

$$\tilde{FEE}_{B\tau} = (\delta/12) \sum_{t=1}^{12} X_t(\tilde{R}_{pt} - \tilde{R}_{st}) \tag{B1}$$

For the fiscal year-end fee plan, the year τ fee ratio is given by

$$\tilde{FEE}_{A} = \delta(\tilde{R}_{p,12} - \tilde{R}_{s,12}) \tag{B2}$$

Assuming the differential return variables have the same expected values, then the expected fee ratio under the fiscal year plan will equal the rolling 12 month value times $(12/\Sigma X_t)$; that is

$$E(\tilde{FEE}_{A\tau}) = (12/\Sigma X_t) \cdot E(\tilde{FEE}_{B\tau}) \tag{B3}$$

Thus, the expected fee ratios will be equal only in the case where the assets during the previous 24 months have remained constant; that is for $X_t = 1$ for $t = 1, \ldots, 12$. Since the net assets of the sample funds increased during the 12 year simulation period, we would expect advisory compensation under the fiscal year plan to exceed that for the rolling 12 month plan.

The fee ratio standard deviations under the fiscal year-end plan will exceed the rolling 12 month values by a factor between $(12/\Sigma X_t)$ and

$(12/\sqrt{\Sigma X_t^2})$ depending on the degree of intercorrelation among the twelve one-year return differentials $(R_{pt} - R_{st})$. The first factor corresponds to perfect correlation among the return differentials, the second to zero correlation. Note that as the degree of intercorrelation declines, the fiscal year-end fee ratio standard deviations increases substantially.

C. Alternative Index Cases

We first describe a general expression for the change in fee ratio when an alternative index is used, and then specialize the result for each index in turn. For analytical convenience we shall deal with algebraic expressions for monthly fee ratios; however, any results so obtained are easily generalizable to the annual or eleven year fee ratio.

The return on the base case comparison standards, $R_{BS}^{k}(k = 1, 2)$, for plans 1 and 2 are given by

$$\tilde{R}_{BS}^{1} = R_M - EX_B^1 \tag{B4a}$$

$$\tilde{R}_{BS}^{2} = R_F + \beta_P(\tilde{R}_M - R_F) - EX_B^2 \tag{B4b}$$

where R_M and R_F are the 12-month returns on the S & P 500 Index and risk-less asset, and β_P is the fund's beta value relative to the index. (For the ease of exposition the t subscripts have been deleted from the return variables.)

For the alternative case, the $\tilde{R}_{AS}^{k}(k = 1, 2)$ are given by

$$\tilde{R}_{AS}^{2} = R_M^1 - EX_B^1 \tag{B5a}$$

$$\tilde{R}_{AS}^{2} = R_F + \beta_P^1(R_M^1 - R_F) - EX_B^2 \tag{B5b}$$

where $\tilde{R}_M^1$ is the 12-month return on the alternative index, and β_P^1 is the

fund beta relative to this index.

The alternative case monthly fee ratio, $\tilde{FEE}_A^k$, is given by

$$\begin{aligned}\tilde{FEE}_A^k &= \delta(\bar{A}_t/A_t)(\tilde{R}_p - \tilde{R}_{AS}^k) \\ &= \delta^*(\tilde{R}_p - \tilde{R}_{AS}^k) \\ &= \delta^*(\tilde{R}_p - \tilde{R}_{BS}^k) + \delta^*(\tilde{R}_{BS}^k - \tilde{R}_{AS}^k) \\ &= \tilde{FEE}_B^k + \delta^*(\tilde{R}_{BS}^k - \tilde{R}_{AS}^k) \qquad \text{(B6)}\end{aligned}$$

where δ^* is the scaling factor which converts 12 month differential returns $(R_p - R_{AS}^k)$ into performance fee ratios (note that in the no-growth case $\delta^* = \delta \tilde{=} 4.0$). Substituting from Equations (B4) and (B5) into Equation (B6), we obtain

$$\tilde{FEE}_A^1 = \tilde{FEE}_B^1 + \delta^* \cdot (\tilde{R}_M - \tilde{R}_M^1) \qquad \text{(B7a)}$$

$$\tilde{FEE}_A^2 = \tilde{FEE}_B^2 + \delta^*\{(\beta_P - \beta_P^1)(\tilde{R}_M^1 - \tilde{R}_F) + \beta_P(\tilde{R}_M - \tilde{R}_M^1)\} \qquad \text{(B7b)}$$

For plan 1, the expected change in fee ratio is independent of fund beta, depending only on the difference in index returns. For the 12-year simulation period, the average annual differences in return, $(R_M - R_M^1)$, between the S & P 500 Index and 1) the S & P 500 without dividends, 2) the Dow Jones Industrial Index, and 3) the unweighted NYSE index were 3.24 percent, 1.80 percent, and -2.52 percent per year, respectively. Thus, assuming $\delta^* \tilde{=} 4.0$, the alternate case average fee ratios are predicted to increase by 12.96, 7.20, and -10.08 respectively, with the changes uni-

formly distributed with beta.

Under plan 2, the use of risk-adjusted performance measures will reduce the effects of index changes. In fact, if the alternative indices had risk-return characteristics such that any index was a linear combination of the risk-free rate and the Standard and Poor's 500 Index, then the choice of indices would not affect the amount of performance fee compensation earned (i.e., $\beta_P(R_M - R_F)$ would equal $\beta_P^1(R_M^1 - R_F)$, and thus $\tilde{R}_{BS}^2$ would equal $\tilde{R}_{AS}^2$). However, this is not the case. During the 12-year simulation period the Dow 30 and S & P 500 without dividends had lower returns on a risk adjusted basis than the S & P 500 index. These indices had alphas equal to -0.11 and -0.28 percent per month respectively during the 12-year test period. Thus, they are relatively easy standards on a risk adjusted basis. The unweighted NYSE index on the other hand turned out to be a more difficult standard on a risk adjusted basis, having a positive alpha relative to the S & P 500 index of 0.10 percent per month. Thus, we would expect the funds to have higher 11-year fee ratios relative to the first two indices, and lower values relative to the third. Using the average changes in fund beta values, $(\bar{\beta}_P - \bar{\beta}_P^1)$, and the realized returns on the alternative indices, $\bar{R}_M^1$, [34] the predicted increases in the average plan 2 fee ratios are 12.26 for the S & P 500 without dividends, 7.71 for the Dow 30 Index, and -10.84 for the unweighted NYSE Index.

D. Null Zone Tests

To evaluate the statistical significance of the 12 month differential return $(R_{pt} - R_{st})$, we can examine the variation in the month-to-month differences and test whether the mean monthly value can be considered

significantly different from zero at a specified confidence level (e.g. the 90 percent level). The null zone provision requires the mean difference to be more than a specified number (T_{MIN}) of standard deviations greater or less than zero before a fee is paid, or penalty exacted. The value of (T_{MIN}) depends on the confidence level required. This would eliminate payments or penalties for "random" return differences between the fund and its comparison standard.

The specification of the test differs slightly for plans 1 and 2. For plan 1 we have used the significance test proposed by the Securities and Exchange Commission.[35] The test statistic is equal to the mean monthly return difference between the fund and market index, divided by the standard error of the mean. That is

$$t_{\alpha} = \frac{\overline{XS} \cdot \sqrt{12}}{\sigma(XS)} \qquad \text{(B8a)}$$

where $\overline{XS}$ is the mean monthly differential and $\sigma(XS)$ is the standard deviation of the 12 monthly values. t_{α} has a students t distribution with 11 degrees of freedom[36] (however, see later comments regarding bias in this test).

For plan 2 the alpha value estimated from the regression of the monthly fund returns on the market index is the average monthly differential return. The regression analysis also provides a test statistic for alpha:

$$t_{\alpha} = \frac{\hat{\alpha}}{SE_{\hat{\alpha}}} \qquad \text{(B8b)}$$

where $\hat{\alpha}$ is the estimated alpha and $SE_{\hat{\alpha}}$ its standard error. t_{α} in this case

also has a students t distribution but with ten degrees of freedom.

Given an estimated value for t_α, we can use probability tables for the students t distribution to determine the level of statistical confidence associated with any particular value. Typical values are:

Level of Confidence % (Two tail test)	t value Degrees of Freedom 11 (Plan 1)	10 (Plan 2)
50	0.70	0.70
80	1.36	1.37
90	1.80	1.81
95	2.20	2.23

In practice the mean differences would likely be based on more frequent observations than monthly; for example weekly or daily. This would substantially expand the number of degrees of freedom, hence lower somewhat the T_{MIN} required for a specified level of confidence. For example, the required plan 1 t statistic based on weekly observations for a 90 percent confidence interval would be 1.68, compared with 1.80 with 11 degrees of freedom. Because of the small number of degrees of freedom for our tests we have used somewhat lower confidence requirements in the simulations.

The t tests described above, however, are unbiased only in the case of plan 2. Under the CAPM assumptions the expected value for the plan 2 mean differential return (alpha) is equal to zero, and thus zero is the appropriate null hypothesis for evaluating measured alpha values.

For plan 1 on the other hand the CAPM expected value of the mean differential is not zero, but equal to $(\beta_p - 1)(\bar{r}_M - \bar{r}_f)$, where $(\bar{r}_M - \bar{r}_f)$ is the mean monthly risk premium for the market during the 12 month horizon. Thus, the appropriate null comparison for $\overline{XS}$ is not zero, but the above value. If the test as given by equation (B8a) is used to measure the significance of $\overline{XS}$ (as proposed by the SEC), the results will be biased in favor of the funds with betas greater than 1.0, and against the low beta funds. For example, a perfectly diversified portfolio (i.e. $R^2 = 1.0$) with beta equal to 1.5 and alpha equal to zero would have a t_α value of approximately 0.60 for a typical 12 month interval during the simulation period.[37] Conversely, a comparable fund with beta of 0.5 would have a t_α value of -0.60. Thus, the higher beta funds start out with a "leg up" on the test, the lower risk funds being conversely disadvantaged. The magnitude of the bias is somewhat lower for typical mutual, since they are not perfectly diversified (R^2 less than 1.0). Based on the data in table 2-1, a fund with beta of 1.5 (and zero alpha) would, on average, have a t_α value of approximately 0.25. For a beta of 0.5, the t_α would be -0.50.[38]

The observed bias applies not only to the t test null zones, but to any symmetrical null zone required regardless of how determined. As long as the expected risk premium for the market is positive, the expected differential return is positive for funds with beta values greater than 1, and negative for funds with beta values less than 1. For example, a ten percent per year risk premium would result in a five percent expected differential return for a fund with beta of 1.5, and -5 percent for a fund with beta of 0.5. Thus, if a ten percent null zone was to be used, it should be centered around these expected values (eg. around 5 percent

for a fund with beta of 1.5) and not zero. The CAPM model does not have to be precisely true for this type of bias to exist. As long as higher risk stocks on average tend to outperform the market this beta bias will exist for null zones which are symmetrical about zero.[39]

The data in table 2.1 allows us to estimate the size of the null zones that, on average, over the 12 year simulation period would be associated with specified levels of statistical confidence. The figures in column (4) (ignoring the δ scaling factor) are estimates of the standard deviations of the monthly differential returns for plan 1. The standard error of the 12 month mean differences would equal the column (4) figures divided by the square root of the number of observations (eg. $\sqrt{12}$). Thus, of the 90 percent confidence level ($T_{MIN} = 1.80$) the null zones would range from a high of $\pm$32 percent (on an annualized basis) for beta of 1.5 to a low of $\pm$11 percent beta equal to 1.0. The 12 month standard errors for the plan 2 alpha values tend to increase substantially with beta. Thus, for plan 2 the null zones would be small for low beta funds and large for high beta funds. Thus, it would not be possible to use a single null zone (eg. $\pm$10 percent per year) for all funds, even as a rule of thumb. Further, the size of the null zone for a given beta value will change over time. This is illustrated by the three years of simulation results shown for Keystone K1 fund in Table A1 of Appendix A (see columns 7 and 8). As shown, the t values associated with any given mean differential return changes substantially over the three years.

The impact of a null zone on the expected fee ratio and fee ratio standard deviation can be illustrated as follows. The incentive fee ratio for month t using a null zone is given by

$$\begin{aligned} \tilde{FEE}^{k}_{At} &= \tilde{Z}_t \cdot \delta^* \cdot (\tilde{R}_{pt} - \tilde{R}^{k}_{st}) \\ &= \tilde{Z}_t \cdot \tilde{FEE}^{k}_{Bt} \end{aligned} \tag{B9}$$

where $\tilde{Z}_t$ is equal to 1.0 if the absolute value of the test statistic $|t_\alpha|$ exceeds the required value T_{MIN}, and zero if not. As T_{MIN} is increased, the probability p that $|t_\alpha|$ will exceed T_{MIN} approaches zero. Thus, the expected fee ratio and fee ratio standard deviation will approach zero as T_{MIN} is increased. This is easily shown for the simple case where $\tilde{Z}_t$ is assumed to be statistically independent of $(\tilde{R}_{pt} - \tilde{R}_{st})$. In this case the expected value of Z_t is equal to p, and

$$E(\tilde{FEE}^{k}_{At}) = p \cdot E(\tilde{FEE}_{Bt}) \tag{B10a}$$

$$\sigma(\tilde{FEE}^{k}_{At}) = p \cdot \sigma(\tilde{FEE}_{Bt}) \tag{B10b}$$

Thus, as T_{MIN} increases, p will approach zero forcing the expected fee ratio and fee ratio standard deviation to zero as well.

E. <u>36-Month Performance Horizon Tests</u>

The use of the 36-month horizon has no effect on the form of the fee ratio equations, as given by Equations (4) and (7) for plans 1 and 2 respectively. However, the plan 1 beta bias, resulting from the term $\delta^*(\beta_p - 1)(\tilde{R}_{Mt} - R_{Ft})$ will now be magnified. This follows because the market risk premium $(R_{Mt} - R_{Ft})$ is now measured over a 36- rather than a

12-month interval. Since the current practice is not to annualize the 36 month return differential, or correspondingly multiply by three the differential return required to earn the maximum premium (i.e. 54 percent for plans 1 and 2 rather than 18 percent), then the expected slope of the relationship between fee ratios and betas is increased by a factor of 3. Since the plan 2 fee ratio does not depend on the value of $R_{Mt} - R_{Ft}$ (see Equation (7), the 36-month horizon should have no impact on the level of compensation or its relationship to fund beta values.

The fee ratio standard deviation will be increased by the shift to a 36-month horizon. The 36-month differential return can be approximately expressed as the sum of 36-month differences, that is

$$(\tilde{R}_{Pt} - \tilde{R}^{k}_{st}) = \sum_{j=1}^{36} (\tilde{r}_{Pj} - \tilde{r}^{k}_{sj}) \qquad \text{(B11)}$$

where $\tilde{r}_{Pj}$ and $\tilde{r}_{sj}$ are as the month j fund and standard return. The monthly fee ratio for the 36-month plan is thus given by

$$\tilde{FEE}^{k}_{At} \tilde{=} \delta^{*} \sum_{j=1}^{36} (\tilde{r}_{Pj} - \tilde{r}^{k}_{sj}) \qquad \text{(B12)}$$

Given the random walk nature of security and portfolio returns, we can safely assume that the monthly return differentials are not statistically correlated. Assuming a constant standard deviation σ^{k} for the monthly differentials, then the fee ratio standard deviations for the 12- and 36-month plans are given by

$$\sigma(FEE^{k}_{Bt}) = \sqrt{12} \cdot \delta^{*} \cdot \sigma^{k} \qquad \text{(B13a)}$$

$$\sigma(\tilde{FEE}^{k}_{At}) = 6 \cdot \delta^{*} \cdot \sigma^{k} \qquad \text{(B13b)}$$

and therefore

$$\sigma(\tilde{FEE}^{k}_{At}) \tilde{=} \sqrt{3} \cdot \sigma(\tilde{FEE}^{k}_{Bt}) \qquad \text{(B13c)}$$

Thus, the average fee ratio standard deviations for both 36-month plans are predicted to exceed those for the 12-month plans by a factor of approximately 1.8. Note that if the 36-month return differentials were annualized, the 36-month plan would have the same fee ratio standard deviation as the 12-month plan.

Footnotes

1. Respectively, Professor and Associate Professor of Finance, Sloan School of Management, M.I.T. This paper was originally prepared by us as parts II and III of an unpublished manuscript entitled "A Study of Investment Company Incentive Fee Arrangements." This research was supported by a grant from the Investment Company Institute, Washington, D. C.

2. Source: SEC Institutional Investor Study [ ], p. 254.

3. SEC Survey of Incentive Fee Plans [ ], p. 1.

4. Source: Letter of Transmittal to SEC Institutional Investor Study [ ], p. XIV, last paragraph.

5. Op. Cit., p. XV, second paragraph.

6. Investment Advisers Act Release Number 315 [ ], "Selection of an Appropriate Index," pp. 3 and 4.

8. For example, the incentive compensation in existing plans are bounded above and below at some specified return differential between the fund and comparison standard.

9. The relationship between $\sigma^2(\varepsilon_p)$ and β_p was estimated for the 49 sample using monthly data for the 12 year period from 1960 to 1971. Time series estimates of $\sigma^2(\varepsilon_p)$ and β_p were obtained by regressing fund risk premiums (returns less the 30 treasury bill rate) on the S & P 500 index risk premiums. The relationship was then estimated cross-sectionally by regressing $\sigma^2(\varepsilon_p)$ on β_p. Since the relationship is non-linear, the regression equation included a term β_p^2 as well. The resulting equation is

$$\sigma^2(\varepsilon_p) = \underset{(1.7)}{4.17} - \underset{(-2.5)}{14.9\beta_p} + \underset{(4.7)}{16.4\beta_p^2} \quad (R^2 = 0.62)$$

The figures in brackets are the t statistics for the regression coefficients.

10. The values in Table 2.1 are based on monthly calculations. Thus, the fee ratio standard deviation, $\sigma(FEE_p)$, is for a one month performance measurement horizon. In the simulation calculations, however, a 12 month performance measurement horizon is used. Thus, the annual fee ratio standard deviations will exceed the monthly values by a factor of $\sqrt{12}$, given the independence property of the monthly returns. The shape of the $\sigma(FEE_p)$ versus β_p curve, therefore, will remain unchanged.

11. The basic fee schedule was suggested by the Investment Company Institute as representative of typical rates during the 1960-1971 period. For the 103 performance fee plans surveyed by the SEC [ ] in January of 1972, 74 percent had a maximum basic fee rate (payable on the first increment of net assets) between 0.50 and 0.75 percent.

12. 93 of the 103 performance fee plans in existence in January 1972 measured performance over a 1 year horizon. Of these 24 used a rolling 12 month calculation, and 57 a single fiscal year-end measure (REF SEC SURVEY [ ], Table II, Page 6). The effect of this difference is examined in Part III.

13. 63 percent of the 103 performance fee plans in existence in January 1972 measured fund performance relative to the S & P 500 stock index (REF SEC SURVEY [ ], Table I, p. 5). However, almost none of these funds adjusted the index for dividend distributions (op. cit. Table IX, p. 13). The questions of index choice and treatment of dividends are examined in Part III.

14. Industry sources were polled to provide estimates of the fund borrowing rates, as a function of fund size. For large funds (500 million or more assets) the prime rate was used. For medium size funds (100-500 million) the rate was increased by 0.25 percent per year. For small funds (under 100 million) the rate was increased by 0.50 percent per year.

15. For the 103 incentive fee plans in existence as of January 1972, the maximum performance fee adjustment for 53 percent of the funds occurred for return differentials between ± 6 and ± 10 percentage points. The largest differential used was ± 24 percentage points (Ref. SEC SURVEY [ ], Table VII, p. 11). The ± 18 percent limits used in the simulations are patterned after the Oppenheimer Fund performance fee plan (prospectus dated April 12, 1972).

16. Approximately one half of the 103 plans in existence as of January 1972 had performance fee adjustments which increased and decreased continuously as the return differential increased and decreased, and the other half had fee adjustments which changed only for discrete changes in the return differential. (REF. SEC SURVEY [ ], Table X, p. 14). The 0.022 percent continuously varying rate used in the simulations is patterned after the Oppenheimer Fund performance fee plan.

17. Rule 205.2 under the Investment Advisers Act of 1940 [ ] requires that the same asset base be used for computing both the base and performance fees; for example, the average assets during the previous 12 months. When a rolling period fee plan (such as Plan 1 or 2) is used, however, the base fee can be based on the average asset value during the most recent subperiod of the rolling period. This is our rationale for computing the basic fee on the average assets during the month, while computing the performance fee on the average net assets during the previous 12 months.

18. See fottnote 14 for the definition of the fund size categories.

19. The funds are Equity Progress Fund ($\beta = 1.35$) and the Value Line Special Situations Fund ($\beta = 1.53$). When these two funds are removed from the sample, the slope of the regression line (γ_1) is -5.5 percent, with $t_{\gamma 1} = -1.0$ and $R^2 = 0.05$. Thus, the significant negative slope largely results from these two outliers.

20. The slope of the regression line for the 46 fund sample is 7.34 percent, with $t_{\gamma 1} = 1.48$, and $R^2 = 0.05$.

21. The slope of the 25 fund low beta sample is 34.70 percent, with $t_{\gamma 1} = 3.15$ and $R^2 = 0.30$.

22. For the 28 fund low beta sample, the standard deviation of the distribution of the fund betas is 0.25. When the three bond funds are removed, it is reduced by almost half, to 0.14. The primary reason for including the 3 bond funds was to obtain this wider dispersion of fund betas.

23. The regression slope for the high beta sample excluding the two outliers is -5.45 percent, with $t_{\gamma 1} - 0.80$ and $R^2 = 0.04$.

24. For the 46 fund sample, $\gamma_1 = -2.27$ percent, with $t_{\gamma 1} = -0.50$ and $R^2 = 0.01$ For the 25 fund low beta sample, $\gamma_1 = 18.18$ percent, with $t_{\gamma 1} = 1.83$ and $R^2 = 0.13$.

25. The slope of the fee/ratio standard deviation regression line versus beta/for the low risk subsample (excluding the 3 bond funds) is -8.60 percent, with t statistic of -1.46 and R^2 of 0.09.

26. The slope of the regression line for the low beta subsample if 9.96 percent, with t value of 1.58 and R^2 of 0.12.

27. The advantage of slightly higher compensation under the fiscal year plan is at least partially offset by the delay in receiving a substantial portion of the total advisory compensation. Section 205 of the Investment Advisers Act prohibits interim performance fee payments. For the fiscal year-end plan this means that only the minimum possible level of advisory fees can be collected on a monthly basis during the year (i.e. the base or fulcrum fee rate less the maximum possible performance penalty rate). The rest is collected at the end of the year after the final performance is known. Under the rolling period scheme, however,

the advisory fee earned during the most recent subperiod (eg. month) of the rolling horizon can be paid. This permits the adviser to receive the base fee for the last month plus or minus the most recent 12-month incentive fee adjustment. Thus, the adviser receives his fee at a reasonably continuous rate, rather than receiving a balloon payment at year end. See Investment Advisers Act Release No. 315 [ ], page 5.

28. Since August of 1972, when the Advisers Act Rule No. 205-1 was adopted the return on the index used in a performance fee plan must include the reinvestment of cash dividends of the companies which comprise the index. However, we include this case in order to examine the impact on advisory compensation of this regulatory change.

29. 57 percent of the 103 performance fee plans in existence in January 1972 employed a performance fee null zone. The most common null zones fell into the range between ± 1 percentage point and ± 5 percentage points (approximately 43 percent of the 103 plans). The null zones were all centered about a zero return differential between the fund and the index used (Ref. SEC Survey [ ], Table VI, page 10).

30. Investment Advisers Act Release No. 315 [ ], page 9, paragraph 2.

31. Op cit., page 9, paragraph 3 and footnote.

32. Op. cit., page 10, paragraph 2 and footnote.

33. 40 of the 103 funds in the SEC Incentive Fee Survey [ ] had sufficient history or assets to have beta measures included in the Wiesenberger December 1972 mutual fund performance survey [ ]. The betas were based on monthly returns for from 1 to 10 year periods (depending

on data availability) ending in November 1972, and were computed relative to the S & P 500 Stock Composite Index. The following gives the distribution of the 40 values.

BETA RANGE	.7-.8	.8-.9	.9-1.0	1.0-1.1	1.1-1.2	1.2-1.3	1.3-1.4	1.4-1.5	1.5-1.6	1.6-	TOTAL
NO.OF FUNDS	1	2	4	5	2	7	7	5	3	4	40

The average beta was 1.34, with only 7 funds with betas less than 1.0. The maximum betas were 1.95 and 2.31.

34. For the S & P 500 without dividends, $\overline{\beta}_P^{-1} = 0.946$, $\overline{R}_M = 0.78\%$ per month; for the Dow Jones, $\overline{\beta}_P^{-1} = 0.785$, $\overline{R}_M^{-1} = 0.90\%$ per month; for the unweighted NYSE Index, $\overline{\beta}_P^{-1} = 0.776$, $\overline{R}_M^{-1} = 1.26\%$ per month; for the S & P 500, $\overline{R}_M = 1.05\%$ per month, and $\overline{R}_F = 0.34\%$ per month. The betas of the three alternative indices versus the S & P 500 were 1.00, 0.94, and 1.02 respectively.

35. The t test formula proposed by the SEC differs from ours in one respect; the differential return is measured by the difference in the natural logarithms of the fund and market index returns. However, this change will make little or no difference in practice, particularly when short intervals such as weeks or months are used to measure the return differences.

36. For the general case of N return differences,

$$1/N \sum_{j=1}^{N} XS_j$$

where $XS_j = r_{pj} - r_{Mj}$, r_{pj} and r_{Mj} being the subperiod returns on the fund and market index. The standard deviation of the N return differentials is given by

$$\sigma(XS) = \left\{ \frac{1}{N-1} \sum_{j=1}^{N} (XS_j - \overline{XS})^2 \right\}^{1/2}$$

The standard error of the mean is equal to $\sigma(XS)$ divided by the square root of N. Thus, the test statistic t_α is given by

$$t_\alpha = \frac{\overline{XS} \cdot \sqrt{N}}{\sigma(XS)}$$

where t_α has a students t distribution with N - 1 degrees of freedom.

37. For a perfectly diversified fund with beta = β_p and alpha equal to zero, the plan 1 t statistic has an expected value equal to

$$E(t_\alpha) = \frac{(\beta_p - 1)\, E(r_M - r_f)\sqrt{12}}{[(\beta_p - 1)^2 \sigma^2 (r_M - r_f)]^{1/2}}$$

where $E(r_M - r_f)$ is the expected month market risk premium, and $\sigma^2(r_M - r_f)$ is the variance of the market risk premium. See column (2) of table 2-1 for estimated denominator values as a function of fund beta. The average market risk premium during the 12 years ($\overline{r_M - r_f}$) was 0.71 percent per month.

38. The expression for t_α in footnote 34 must now be modified to allow for imperfect fund diversification. This simply requires addition of the term $\sigma^2(\varepsilon_p)$ inside the square root sign in the denominator. Estimated values for the denominator are now given in column (4) of table 2.1. Note the bias reduction will be the largest for the high beta funds since the residual variations for these funds is greater than for the low beta funds.

39. One of the better documented propositions in the field of finance is

that over long run periods, higher risk stocks tend to have higher rates of return, on average (see, for example, Black Jensen & Scholes [ ], Fama and MacBeth [ ], Modigliani and Pogue [ ], section 7, pp. 35-45). This fact is sufficient to establish the various plan 1 beta biases.

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TABLES AND EXHIBITS

FOR

A STUDY OF MARKET LINE BASED INVESTMENT PERFORMANCE FEES

by

Franco Modigliani and Gerald A. Pogue

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Figure 2-1

Predicted Relationship between Performance Fee and Beta for Plans 1 and 2

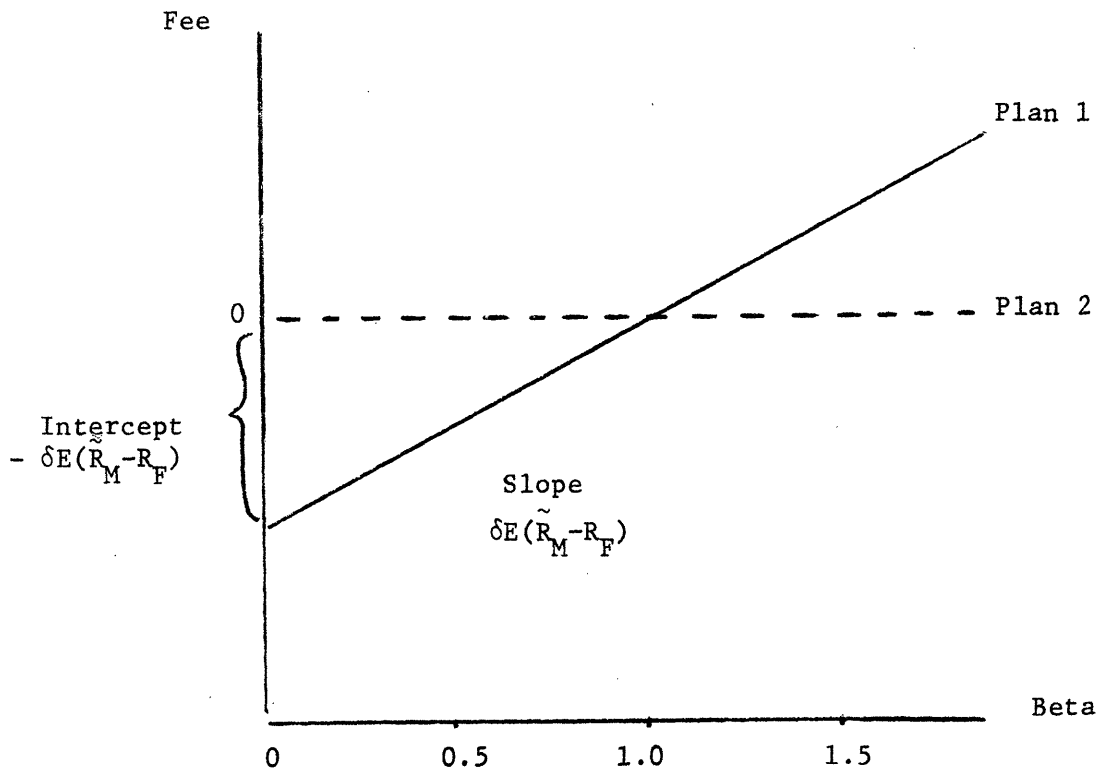

Figure 2-2

PREDICTED RELATIONSHIP BETWEEN FEE VOLATILITY AND BETA FOR PLANS 1 AND 2

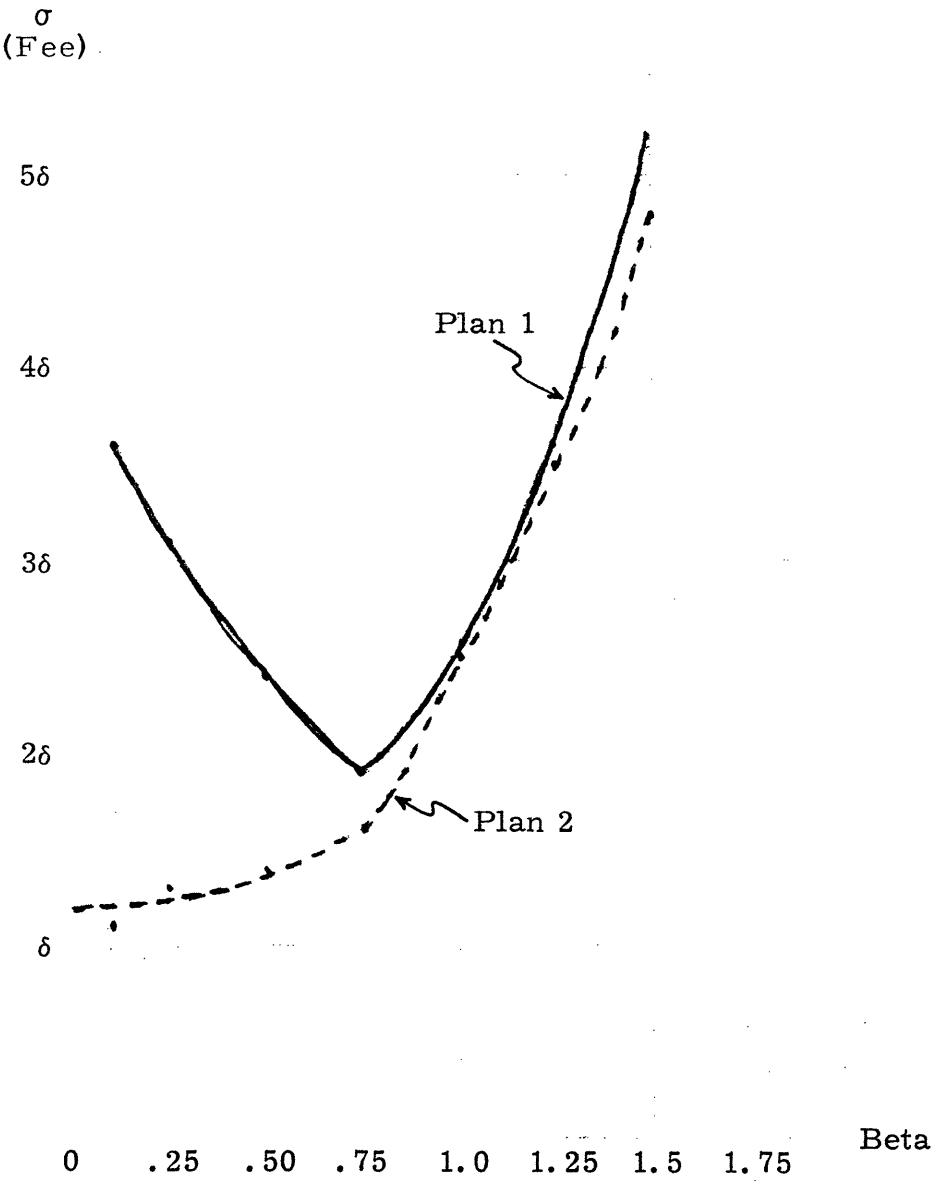

Figure 2-3

Performance Fee Ratio versus Beta: Plan 1

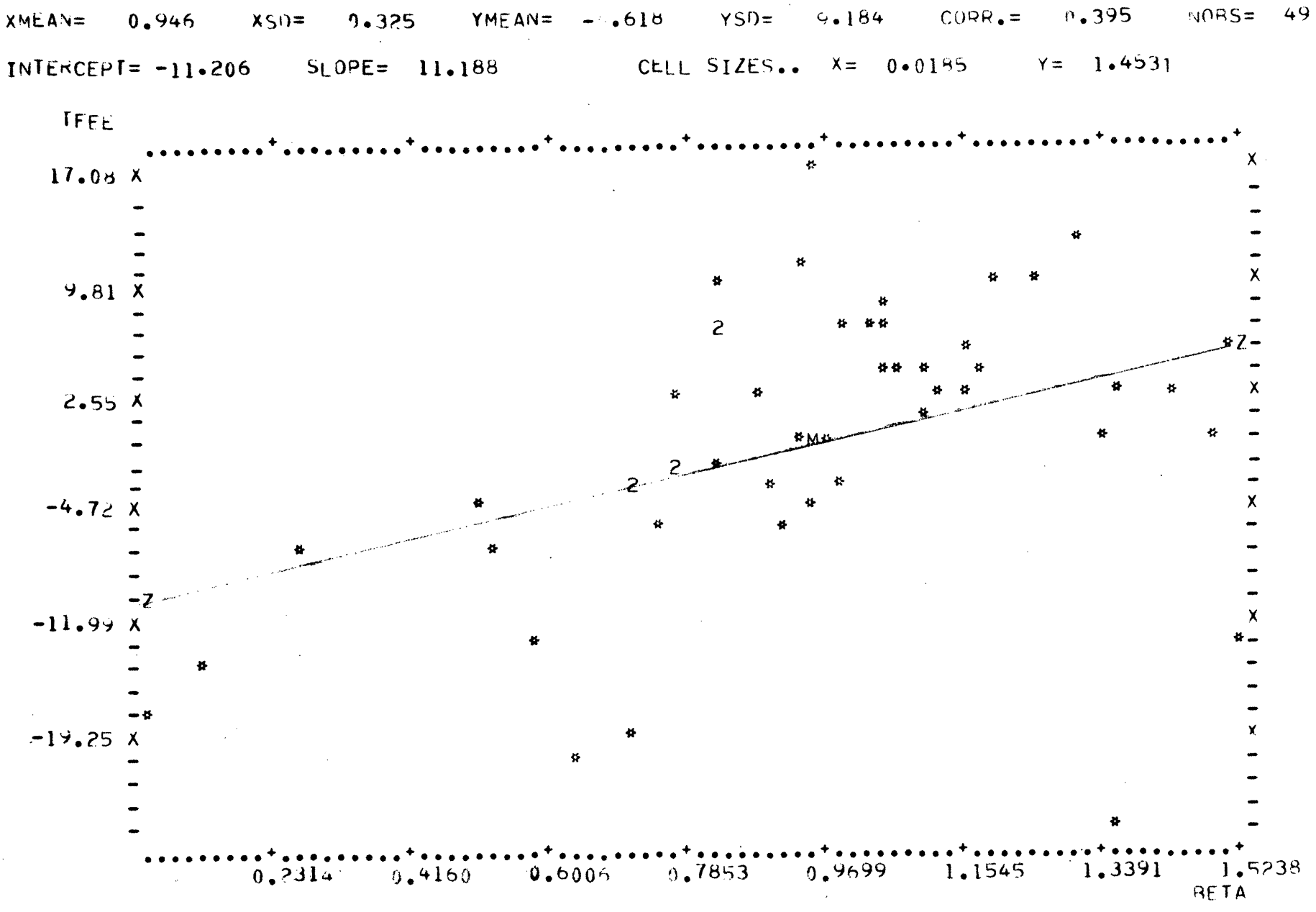

Figure 2-4

Performance Fee Ratio versus Beta: Plan 2

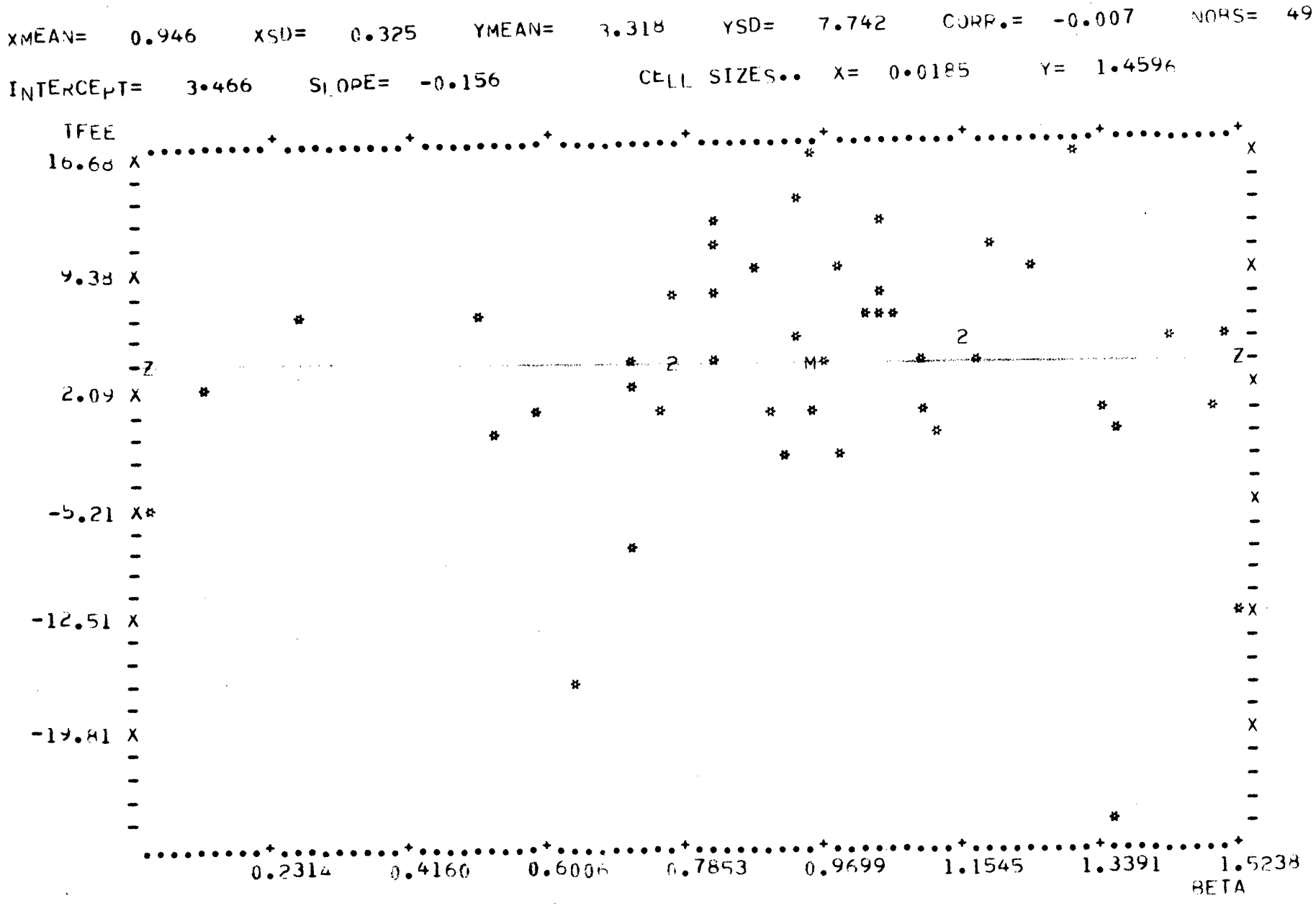

Figure 2-5

Differences in Performance Fee Ratios versus Beta: Plan 2 minus Plan 1

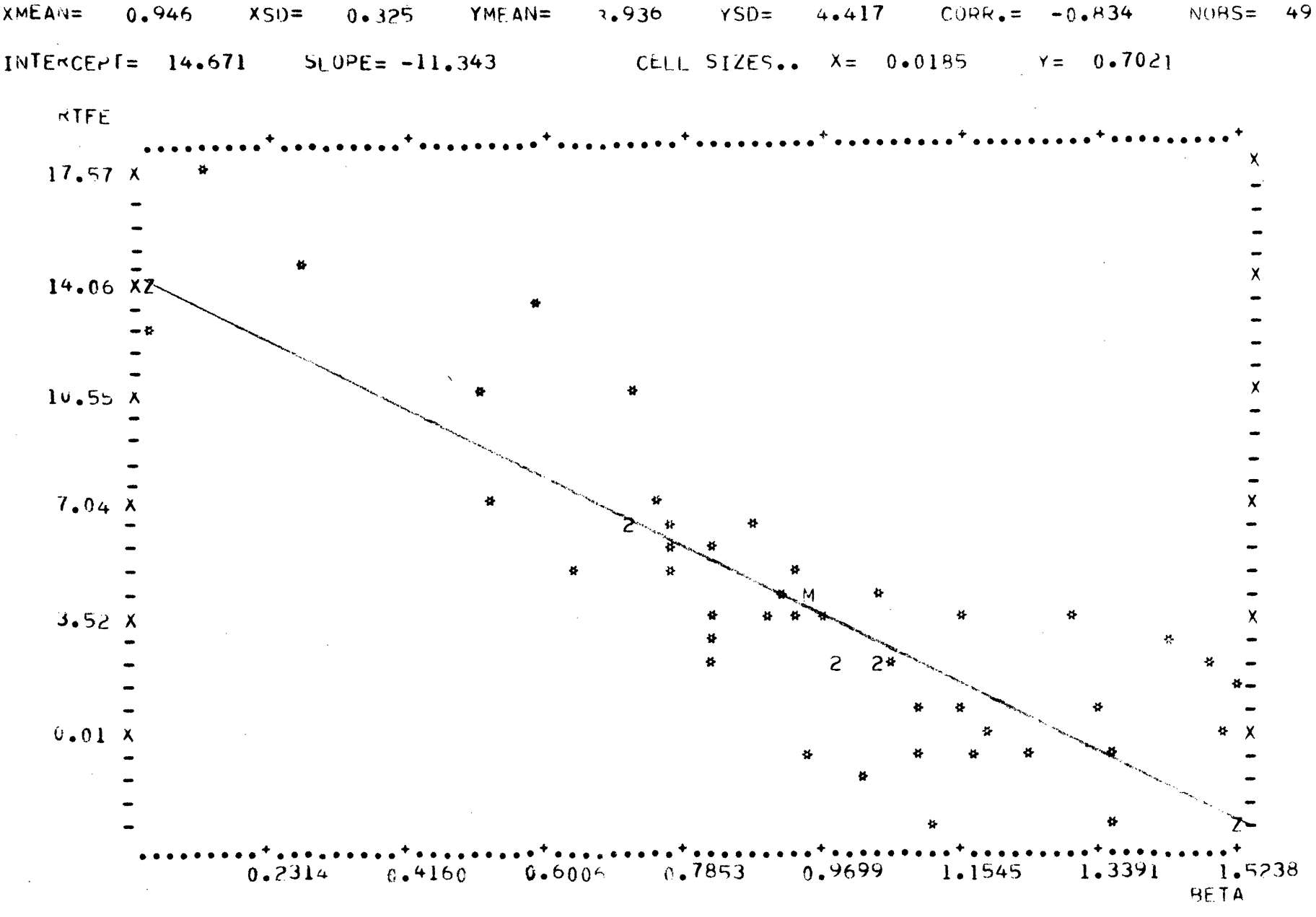

Figure 2-6

Fee Ratio Standard Deviation versus Beta: Plan 1

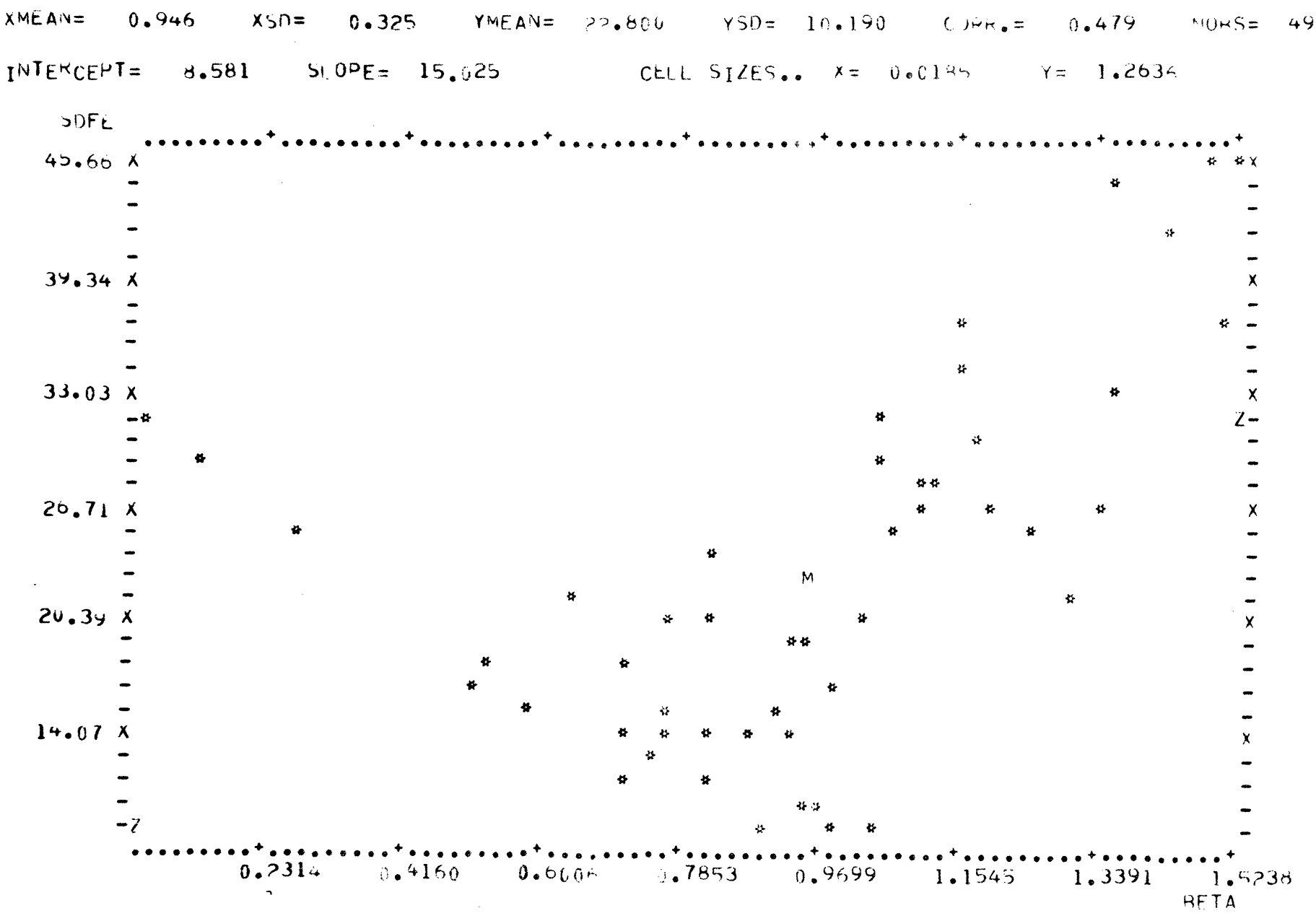

Figure 2-7

Fee Ratio Standard Deviation versus Beta: Plan 2

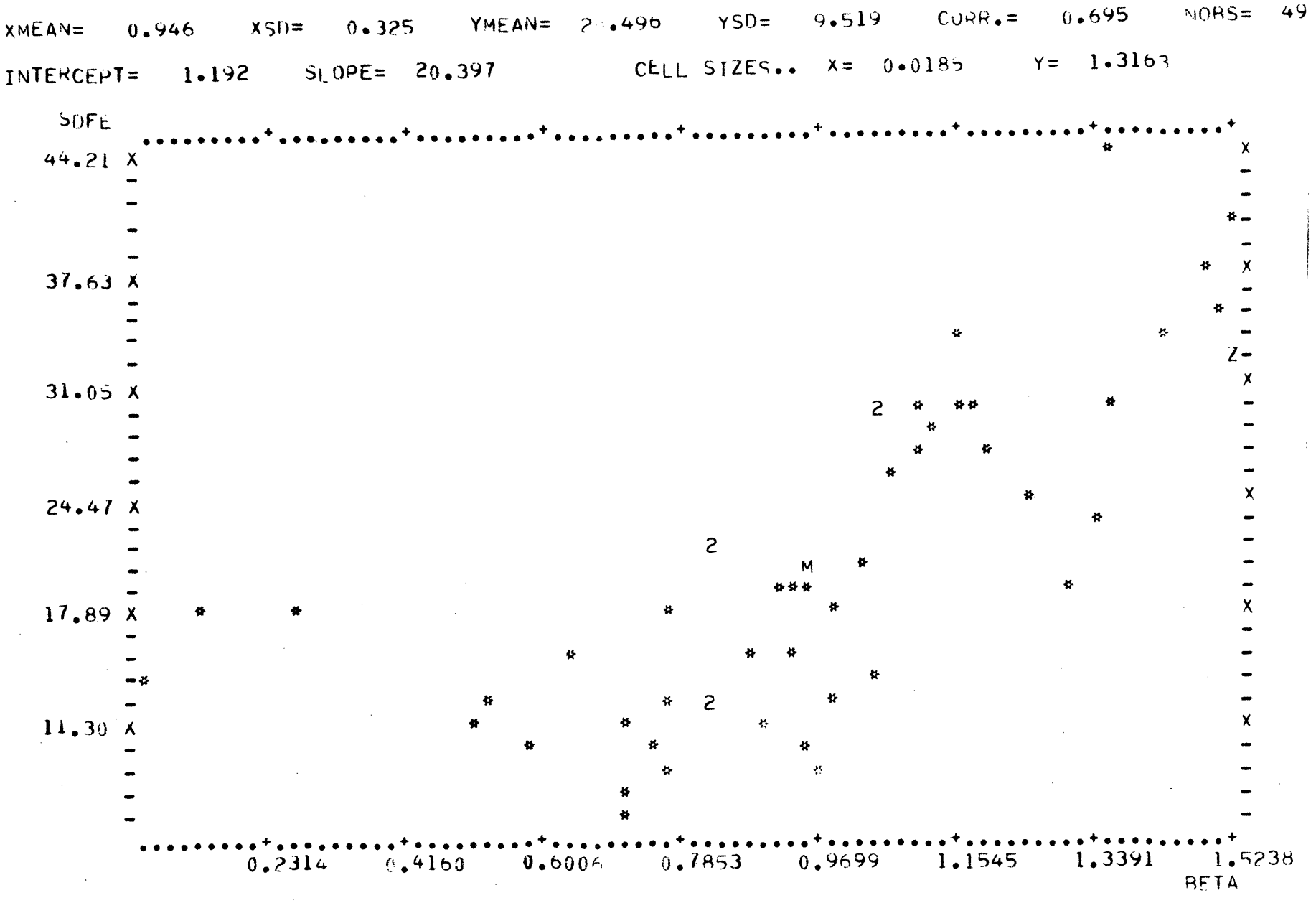

Figure 2-8

Differences in Fee Ratio Standard Deviations versus Beta: Plan 2 minus Plan 1

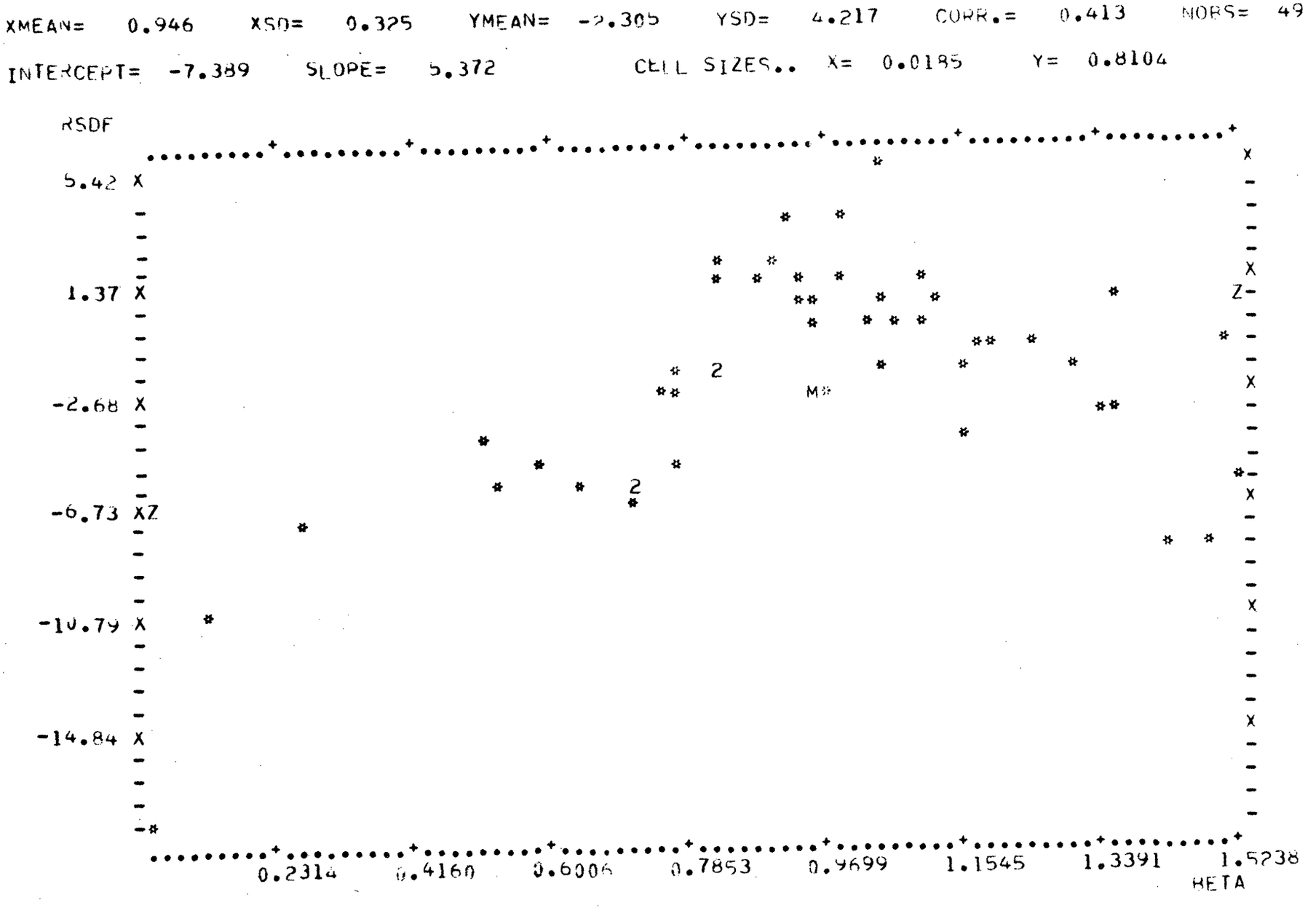

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Table 2-1

COMPONENTS OF PREDICTED FEE VOLATILITY FOR PLANS 1 AND 2

(Percent per Month)

(1)	(2)	(3)	(4)	(5)
Fund	Components of Fee Variation		σ(Fee)	σ(Fee)
(β_p)	Market Component $\delta^2(\beta_p - 1)^1\ \sigma^2(R_m - R_f)$*	Residual Component $\delta^2\sigma^2(\epsilon_p)$**	Plan 1 $\sqrt{(2) + (3)}$	Plan 2 $\sqrt{(3)}$
1.50	$3.5\ \delta^2$	$23.3\ \delta^2$	$5.2\ \delta$	$4.8\ \delta$
1.25	$0.9\ \delta^2$	$12.1\ \delta^2$	$3.6\ \delta$	$3.5\ \delta$
1.00	.0	$6.0\ \delta^2$	$2.5\ \delta$	$2.5\ \delta$
0.75	$0.9\ \delta^2$	$2.6\ \delta^2$	$1.9\ \delta$	$1.6\ \delta$
0.50	$3.5\ \delta^2$	$2.1\ \delta^2$	$2.4\ \delta$	$1.4\ \delta$
0.25	$7.9\ \delta^2$	$1.7\ \delta^2$	$3.1\ \delta$	$1.3\ \delta$
0.10	$11.3\ \delta^2$	$1.3\ \delta^2$	$3.6\ \delta$	$1.1\ \delta$

* $\sigma^2(R_m - R_f) = 14.7\%$ per month.

** Graphically interpolated from scattergram of $\hat{\sigma}^2(\epsilon_p)$ versus $\hat{\beta}_p$ for 49-fund sample; based on monthly returns for Jan. 60 - Dec. 71 period.

Table 2-2

INDIVIDUAL FUND RESULTS FOR PLAN 1

	FUNDNAME	(1) BASIC FEE ($ MILL)	(2) INCENT FEE ($ MILL)	(3) TOTAL FEE ($ MILL)	(4) FEE RATIO (3)/(1)	(5) 12 YR AVG FEE RATIO (%)	(6) STD. DEV FEE RATIO (%)	(7) AVG. BETA	(8) STD DEV BETA
1	AFFILIATED FUND	56.702	1.648	58.35	102.91	100.17	13.46	0.88	0.10
2	AMER. BUSINESS SHS.	1.759	-0.085	1.67	95.18	95.81	16.15	0.51	0.07
3	AMERICAN MUTUAL	18.775	1.395	20.17	107.43	105.93	11.75	0.82	0.22
4	ANCHOR INCOME	9.002	-0.569	8.43	93.63	93.21	12.80	0.74	0.14
5	AXE-HOUGHTON FUND B	15.188	-0.318	14.87	97.91	96.63	20.54	0.81	0.23
6	AXE-HOUGTON STOCK	2.586	0.011	2.60	100.42	107.11	29.49	1.10	0.30
7	BULLOCK FUND	7.795	0.307	8.10	103.94	102.70	9.39	1.04	0.23
8	CHASE FUND OF BOSTON	3.469	-0.029	3.44	99.15	98.67	46.09	1.49	0.46
9	CHEMICAL FUND	24.948	4.442	29.39	117.80	119.47	19.36	0.94	0.23
10	THE COLONIAL FUND	11.724	-0.003	11.72	99.97	100.06	13.51	0.84	0.14
11	DELAWARE FUND	18.197	1.748	19.95	109.60	103.21	25.44	1.24	0.22
12	THE DREYFUS FUND	72.205	3.258	75.46	104.51	105.03	26.54	1.10	0.12
13	EATON & HOWARD BAL.	12.883	-1.681	11.20	86.95	87.74	15.32	0.58	0.16
14	EATON & HOWARD STK.	14.508	-0.626	13.88	95.69	95.65	9.74	0.95	0.11
15	ENERGY FUND	4.710	0.109	4.82	102.32	100.65	27.87	1.11	0.15
16	EQUITY PROGRESS	1.764	-0.455	1.31	74.21	75.68	44.38	1.35	0.55
17	FIDELITY CAPITAL	23.855	0.400	24.31	101.93	105.57	33.20	1.35	0.28
18	FIDELITY FUND	36.620	2.683	39.30	107.33	106.78	16.51	0.99	0.09
19	FIDELITY TREND	36.656	-0.387	36.27	98.94	105.20	26.23	1.34	0.39
20	HAMILTON FDS.-HDA	27.973	-1.731	26.24	93.81	92.01	15.55	0.91	0.24
21	INVEST.CO. OF AMER.	35.341	3.879	39.22	110.98	110.12	19.00	0.93	0.12
22	KEYSTONE B-1	0.712	-0.130	0.58	81.71	80.64	32.09	0.06	0.06
23	KEYSTONE-B-2	0.671	-0.103	0.57	84.65	85.94	28.81	0.13	0.07
24	KEYSTONE-B-4	6.748	-0.504	6.24	92.54	92.80	25.25	0.28	0.10
25	KEYSTONE K-1	6.947	-0.516	6.43	92.57	92.20	18.49	0.53	0.08

Table 2-2 (Continued)

INDIVIDUAL FUND RESULTS FOR PLAN 1 (Continued)

	FUNDNAME	(1) BASIC FEE ($ MILL)	(2) INCENT FEE ($ MILL)	(3) TOTAL FEE ($ MILL)	(4) FEE RATIO (3)/(1)	(5) 12 YR AVG FEE RATIO (%)	(6) STD. DEV FEE RATIO (%)	(7) AVG. BETA	(8) STD DEV BETA
26	KEYSTONE K-2	12.880	0.236	13.12	101.83	98.88	34.05	1.15	0.26
27	KEYSTONE S-1	2.998	-0.094	2.90	96.87	97.00	8.52	0.90	0.12
28	KEYSTONE S-2	8.123	-0.005	8.12	99.94	99.84	10.82	0.96	0.10
29	KEYSTONE S-3	8.600	0.867	9.47	110.08	103.05	27.34	1.19	0.16
30	KEYSTONE S-4	21.478	0.532	22.01	102.48	101.15	41.95	1.43	0.29
31	LOOMIS-SAYLES MUTUAL	8.665	-0.309	8.36	96.44	95.60	11.25	0.71	0.14
32	MASSACHUSETTS FUND	9.222	-0.317	8.90	96.56	95.02	14.06	0.72	0.14
33	MASS. INVESTORS GR. ST	49.471	3.360	52.83	106.79	104.62	29.87	1.04	0.13
34	MASS. INVESTORS TR.	100.469	-3.855	96.61	96.16	96.37	9.10	0.99	0.23
35	MCDONNELL FUND INC.	1.525	0.078	1.60	105.11	102.75	36.44	1.50	0.56
36	NATION-WIDE SEC.	4.706	-1.000	3.71	78.76	77.51	21.02	0.64	0.18
37	ONE WILLIAM STREET	17.130	0.706	17.84	104.12	102.97	26.04	1.05	0.20
38	OPPENHEIMER FUND	8.781	1.169	9.95	113.32	114.32	21.20	1.31	0.23
39	PIONEER FUND	6.660	0.638	7.30	109.58	108.94	24.49	0.83	0.12
40	T. ROWE PRICE GR. STK.	17.647	1.342	18.99	107.60	98.53	20.56	1.02	0.14
41	PURITAN FUND	27.163	1.754	28.92	106.46	106.16	14.64	0.82	0.13
42	GEO. PUTNAM FD. BOSTON	22.668	-0.554	22.11	97.56	96.75	14.80	0.77	0.09
43	PUTNAM GROWTH FUND	25.126	0.882	26.01	103.51	104.22	30.34	1.17	0.20
44	STEIN R&F BAL.	7.777	-0.109	7.67	98.60	96.76	13.61	0.77	0.14
45	SCUDDER SPECIAL	5.793	0.286	6.08	104.93	105.41	35.19	1.15	0.21
46	VALUE LINE INCOME	5.984	0.118	6.10	101.98	101.40	20.46	0.77	0.21
47	VALUE LINE SPEC. SIT.	6.277	-0.883	5.39	85.94	97.36	46.29	1.53	0.22
48	WELLINGTON FUND	82.340	-15.529	66.81	81.14	82.29	17.62	0.71	0.10
49	WINDSOR FUND	9.702	0.761	10.46	107.85	105.29	31.60	1.04	0.18
	AVERAGES	18.835	0.059	18.89	99.38	99.26	22.80	0.95	0.19

Table 2-3

INDIVIDUAL FUND RESULTS FOR PLAN 2

	FUNDNAME	(1) BASIC FEE ($ MILL)	(2) INCENT FEE ($ MILL)	(3) TOTAL FEE ($ MILL)	(4) FEE RATI (3)/(1)	(5) 12 YR AVG FEE RATIO (%)	(6) STD. DEV FEE RATIO (%)	(7) AVG. BETA	(8) STD DEV BETA
1	AFFILIATED FUND	56.702	5.046	61.75	108.90	106.63	15.14	0.86	0.10
2	AMER. BUSINESS SHS.	1.759	0.104	1.86	105.92	105.70	11.50	0.51	0.07
3	AMERICAN MUTUAL	18.775	2.097	20.87	111.17	111.29	12.83	0.82	0.22
4	ANCHOR INCOME	9.002	0.067	9.07	100.75	100.72	9.73	0.76	0.14
5	AXE-HOUGHTON FUND B	15.188	0.487	15.68	103.21	102.32	22.39	0.81	0.26
6	AXE-HOUGTON STOCK	2.586	0.029	2.61	101.11	108.70	29.74	1.10	0.30
7	BULLOCK FUND	7.795	0.468	8.26	106.00	104.75	14.21	1.00	0.23
8	CHASE FUND OF BOSTON	3.469	0.038	3.51	101.10	97.95	37.52	1.49	0.46
9	CHEMICAL FUND	24.948	4.344	29.29	117.41	118.09	19.20	0.94	0.23
10	THE COLONIAL FUND	11.724	0.578	12.30	104.93	106.64	14.70	0.94	0.14
11	DELAWARE FUND	18.197	1.621	19.82	108.91	106.59	24.18	1.24	0.22
12	THE DREYFUS FUND	72.205	2.751	74.96	103.81	104.34	26.59	1.10	0.12
13	EATON & HOWARD BAL.	12.883	0.033	12.91	100.25	100.14	10.48	0.58	0.16
14	EATON & HOWARD STK.	14.508	0.000	14.51	100.00	100.13	10.31	0.95	0.11
15	ENERGY FUND	4.710	-0.039	4.67	99.18	97.31	28.48	1.11	0.15
16	EQUITY PROGRESS	1.764	-0.465	1.30	73.62	76.05	44.37	1.35	0.55
17	FIDELITY CAPITAL	23.855	-0.249	23.60	98.95	100.07	29.75	1.35	0.28
18	FIDELITY FUND	36.620	3.372	39.99	109.21	108.37	18.13	0.99	0.09
19	FIDELITY TREND	36.656	0.000	36.66	100.00	104.52	23.05	1.34	0.39
20	HAMILTON FDS.-HDA	27.973	-0.475	27.50	98.30	96.09	18.99	0.91	0.24
21	INVEST.CO. OF AMER.	35.341	5.038	40.38	114.26	114.18	19.83	0.93	0.12
22	KEYSTONE B-1	0.712	-0.038	0.67	94.65	95.59	13.60	0.05	0.06
23	KEYSTONE-B-2	0.671	0.017	0.69	102.57	100.99	17.91	0.13	0.07
24	KEYSTONE-B-4	6.748	0.479	7.23	107.10	108.42	18.04	0.28	0.10
25	KEYSTONE K-1	6.947	-0.024	6.92	99.66	99.79	12.83	0.53	0.08

Table 2-3 (Continued)

INDIVIDUAL FUND RESULTS FOR PLAN 2 (Continued)

	FUNDNAME	(1) BASIC FEE ($ MILL)	(2) INCENT FEE ($ MILL)	(3) TOTAL FEE ($ MILL)	(4) FEE RATIO (3)/(1)	(5) 12 YR AVG FEE RATIO (%)	(6) STD. DEV FEE RATIO (%)	(7) AVG. BETA	(8) STD DEV BETA
26	KEYSTONE K-2	12.880	0.688	13.57	105.34	102.34	29.91	1.15	0.26
27	KEYSTONE S-1	2.998	0.018	3.02	100.61	100.70	11.05	0.90	0.12
28	KEYSTONE S-2	8.123	0.270	8.39	103.32	103.08	8.15	0.98	0.10
29	KEYSTONE S-3	8.600	0.889	9.49	110.34	107.21	26.48	1.19	0.16
30	KEYSTONE S-4	21.478	1.105	22.58	105.14	101.53	33.85	1.43	0.29
31	LOOMIS-SAYLES MUTUAL	8.665	0.240	8.90	102.77	102.56	5.39	0.71	0.14
32	MASSACHUSETTS FUND	9.222	0.296	9.52	103.21	102.76	7.99	0.72	0.14
33	MASS. INVESTORS GR. ST	49.471	4.273	53.74	108.64	107.02	30.34	1.04	0.13
34	MASS. INVESTORS TR.	100.469	-1.686	98.78	98.32	98.92	12.57	0.99	0.23
35	MCDONNELL FUND INC.	1.525	0.081	1.61	105.32	102.10	35.12	1.50	0.56
36	NATION-WIDE SEC.	4.706	-0.763	3.94	83.79	83.08	15.43	0.64	0.18
37	ONE WILLIAM STREET	17.130	1.036	18.17	106.04	104.99	26.13	1.06	0.20
38	OPPENHEIMER FUND	8.781	1.450	10.23	116.51	114.62	19.33	1.31	0.23
39	PIONEER FUND	6.660	0.839	7.50	112.60	113.47	22.22	0.83	0.12
40	T. ROWE PRICE GR. STK.	17.647	1.127	18.77	106.33	98.12	20.62	1.02	0.14
41	PURITAN FUND	27.163	2.345	29.51	108.63	109.93	12.34	0.82	0.13
42	GEO. PUTNAM FD. BOSTON	22.668	0.948	23.62	104.18	103.73	12.10	0.77	0.09
43	PUTNAM GROWTH FUND	25.126	0.712	25.84	102.83	104.12	29.41	1.17	0.20
44	STEIN R&F BAL.	7.777	0.293	8.07	103.77	103.23	8.22	0.77	0.14
45	SCUDDER SPECIAL	5.793	0.328	6.12	105.66	108.30	34.16	1.15	0.21
46	VALUE LINE INCOME	5.984	0.435	6.42	107.27	106.57	18.36	0.77	0.21
47	VALUE LINE SPEC. SIT.	6.277	-0.777	5.50	87.63	94.56	40.31	1.53	0.22
48	WELLINGTON FUND	82.340	-7.013	75.33	91.48	92.41	10.91	0.71	0.10
49	WINDSOR FUND	9.702	1.149	10.85	111.84	108.47	29.41	1.04	0.18
	AVERAGES	19.219	0.686	19.91	105.35	105.09	20.96	0.97	0.20

Table 2.4

Summary Results: Average Fee Ratios

Plans 1 and 2

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
							$FEE_j = \gamma_0 + \gamma_1(\beta_j) + \varepsilon_j$		
Plan	Funds	Mean Fee Ratio	Std.Dev. of Sample	Min. Fee Ratio	Max. Fee Ratio	No. Ratios >0	γ_0 $(t\gamma_0)$*	γ_1 $(t\gamma_1)$*	R^2
1 Non-Risk Adjusted	All (49)	-0.62	9.18	-25.79	17.80	25	-11.21 (-2.96)	11.19 (2.95)	0.16
	$\beta > 1$ (21)	2.31	8.44	-25.79	13.32	17	28.63 (2.22)	-21.47 (-2.06)	0.18
	$\beta \leq 1$ (28)	-2.82	9.25	-21.24	17.80	8	-20.32 (-4.57)	23.76 (4.14)	0.40
2 Market Line Risk Adjusted	All (49)	3.32	7.74	-26.38	17.41	37	3.47 (1.00)	-0.16 (-0.04)	0.00
	$\beta > 1$ (21)	3.07	8.89	-26.38	16.51	16	29.11 (2.12)	-21.25 (-1.91)	0.16
	$\beta \leq 1$ (28)	3.51	6.92	-16.21	17.41	21	-2.76 (-0.67)	8.50 (1.61)	0.09

* t statistic

Table 2.5

Summary Results: Fee Ratio Standard Deviations

Plans 1 and 2

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
						$SDF_j = \gamma_0 + \gamma_1(\beta_j) + \varepsilon_j$		
Plan	Funds	Mean Standard Deviation	Std. Dev. of Sample	Min. Standard Deviation	Max. Standard Deviation	γ_0 $(t_{\gamma 0})^*$	γ_1 $(t_{\gamma 1})^*$	R^2
1 Non-Risk Adjusted	All (49)	22.80	10.19	8.39	46.29	8.58 (2.14)	15.02 (3.74)	0.23
	$\beta > 1$ (21)	30.88	9.16	8.39	46.29	-15.08 (-1.34)	37.50 (4.13)	0.47
	$\beta \leq 1$ (28)	16.74	5.80	8.52	32.09	29.50 (12.08)	-17.32 (-5.50)	0.54
2 Market Line Risk Adjusted	All (49)	20.50	9.52	5.38	44.87	1.19 (0.39)	20.40 (6.63)	0.48
	$\beta > 1$ (21)	29.21	7.09	14.21	44.87	-0.31 (-0.03)	24.09 (3.03)	0.13
	$\beta \leq 1$ (28)	13.96	4.52	5.38	22.39	13.93 (4.97)	0.04 (0.01)	0.00

* t statistic

Table 2.6

Summary of Differences Between Plan 1 and Plan 2 Results

$RES1_j = FEE_j[Plan2] - FEE_j[Plan1]$

$RES2_j = FSD_j[Plan2] - FSD_j[Plan1]$

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
								$RES_j = \gamma_0 + \gamma_1(\beta_j) + \varepsilon_j$		
Result	Funds	Mean Residual	Sample Std. Deviation	t Ratio	Min Res.	Max. Res.	No. >0	γ_0 ($t_{\gamma 0}$)*	γ_1 ($t_{\gamma 1}$)*	R^2
Average Fee Ratio (RES1)	All (49)	3.94	4.42	6.24	-3.15	17.92	41	14.67 (13.39)	-11.34 (-10.35)	0.69
	$\beta > 1$ (21)	0.75	1.95	1.77	-3.15	4.00	14	0.49 (0.15)	0.21 (0.08)	0.03
	$\beta \leq 1$ (28)	6.32	4.25	7.87	-0.39	17.92	27	17.57 (14.08)	-15.26 (-9.48)	0.78
Fee Ratio Standard Deviation (RES2)	All (49)	-2.30	4.22	-3.83	-18.48	5.83	18	-7.39 (-4.28)	5.37 (3.11)	0.17
	$\beta > 1$ (21)	-1.67	3.24	-2.36	-8.57	5.83	8	14.77 (3.77)	-13.41 (-4.23)	0.49
	$\beta \leq 1$ (28)	-2.78	4.83	-3.05	-18.48	3.47	10	-15.57 (-11.03)	17.35 (9.53)	0.78

* t statistic

Table 2-7

SUMMARY RESULTS: AVERAGE ANNUAL FEE RATIOS

PLAN 1 AND PLAN 2

Funds	Annual Fee Ratio FEE_t	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	Average $\overline{FEE}_t$
All (49)	Plan 1	-1.65	-9.17	-18.85	-16.55	7.42	28.50	11.94	6.24	-9.00	-6.13	-0.84	-0.74
	Plan 2	7.15	-9.49	-9.70	-6.10	9.94	27.68	19.94	6.27	-7.77	-8.72	4.49	3.06
	Difference (Plan 2 - 1)	8.80	-0.32	9.15	10.45	2.52	-0.82	8.00	0.03	1.23	-2.59	5.33	3.80
	$\hat{\gamma}_1$ Plan 1	45.92	-58.65	-5.68	43.19	27.29	38.22	57.41	21.54	-14.61	-11.43	29.46	13.10 *
	$t\gamma_1$ Plan 1	7.54	-10.68	-0.64	7.26	6.64	6.80	6.20	3.97	-2.48	-1.07	3.98	3.74
	$\hat{\gamma}_1$ Plan 2	-3.42	-35.57	-54.30	-9.96	2.92	51.99	37.52	5.32	-3.33	19.26	-19.08	-0.15 *
	$t\gamma_1$ Plan 2	-0.55	-7.02	-6.72	-1.46	0.69	9.38	4.15	0.94	-0.57	2.45	-2.61	-0.05
$\beta > 1$ (28)	Plan 1	13.71	-31.46	-23.69	-12.92	20.31	46.63	29.90	13.60	-14.88	-19.75	7.52	2.64
	Plan 2	5.61	-24.17	-25.38	-16.32	13.54	50.38	33.27	7.94	-10.24	-9.67	3.59	2.60
	Difference	-8.10	7.29	-1.69	-3.40	-6.77	3.65	3.37	-5.66	4.64	9.08	-3.93	-0.04
$\beta \leq 1$ (21)	Plan 1	-13.18	7.53	-15.23	-19.28	-2.24	14.91	-1.54	0.71	-4.58	4.09	-7.10	-3.26
	Plan 2	8.31	1.52	2.06	1.57	7.23	10.66	9.94	5.02	-5.91	-8.11	5.15	3.41
	Difference	21.49	-6.01	17.29	20.85	9.47	-4.25	11.48	4.31	-1.23	-12.20	12.25	6.67
Avg. Market Return ($\overline{R}_{Mt}$)		23.80	-3.80	18.20	19.79	11.83	-1.32	13.60	10.19	2.60	-11.10	23.43	

* Regression Equation $\overline{FEE}_j t = \gamma_0 + \gamma_1 \cdot \beta_j + \epsilon_j$

Table 3-1

DESCRIPTION OF SENSITIVITY ANALYSIS CASES

Case	Change from Basic Fee Plan	Imputed Expenses	Performance Horizon (mo)	Calculation Frequency	Min T Statistic	Market Index
1	Zero operating expenses allocated to comparison portfolio	zero	12	monthly	0.	S&P 500
2	Double operating expenses allocated to comparison portfolio	double	12	monthly	0.	S&P 500
3	Performance measured and fee computed at end of fiscal year	normal	12	annually	0.	S&P 500
4	Performance measures based on S&P 500 without dividends	normal	12	monthly	0.	S&P 500 Without Dividends
5	Performance measures based on Dow 30 Index	normal	12	monthly	0.	Dow 30
6	Performance measures based on unweighted NYSE Index	normal	12	monthly	0.	Unweighted NYSE
7	Min T statistic before incentive fee allowed = 1.0	normal	12	monthly	1.0	S&P 500
8	Min T statistic before incentive fee allowed = 1.6	normal	12	monthly	1.6	S&P 500
9	36-month performance measurement horizon	normal	36	monthly	0.	S&P 500

Table 3-2

OPERATING EXPENSES ASSIGNED TO COMPARISON PORTFOLIO

Case	Cash as % of Net Assets	Brokerage Commissions (%)	Expense Ratio % of Assets			Adj. to Prime Borrowing Rate (%)			Cash Flow Multiple**
			Small	Med	Large*	Small	Med	Large	
Normal (Base Case)	1.5	0.75	0.3	0.25	0.2	0.5	0.25	0	1.0
Zero Expense	0	0	0	0	0	0	0	0	0
Double Expense	3.0	1.5	0.6	0.5	0.4	1.0	0.5	0	2.0

* Fund sizes: small, 0 - 100 M; medium, 100 - 500 M; large, 500 M +.

** Multiple for average industry net cash inflow.

Table 3-3

Fee Plan 1 Sensitivity Analysis: Average Fee Ratios

$RESIDUAL_j[I] = FEE_j[I] - FEE_j[BASE]$

1961 - 1971

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Case	Funds	Mean Res.	Std. Dev.	t Ratio	Min Res.	Max Rex.	N > 0	R^2 for Res. with Beta
1 Zero Expenses	All	-1.11	0.16	-49.75	-1.37	-0.50	0	(+ *) 0.46
	$\beta > 1$	-0.99	0.16	-28.61	-1.17	-0.50	0	(+ *) 0.76
	$\beta \leq 1$	-1.20	0.08	-81.52	-1.37	-1.06	0	(-) 0.00
2 Double Expenses	All	1.44	0.21	48.37	0.66	1.76	49	(- *) 0.46
	$\beta > 1$	1.28	0.21	28.51	0.66	1.52	21	(- *) 0.75
	$\beta \leq 1$	1.56	0.10	81.31	1.37	1.76	28	(+) 0.01
3 Fiscal Year End	All	0.55	2.66	1.45	-6.97	6.36	31	(-) 0.02
	$\beta > 1$	0.75	3.65	0.95	-6.97	6.36	13	(-) 0.00
	$\beta \leq 1$	0.40	1.62	1.30	-3.36	4.01	18	(- *) 0.36

* Significant at 5% level.

Table 3-3 (Continued)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Case	Funds	Mean Res.	Std. Dev.	t Ratio	Min Res.	Max Res.	N > 0	R^2 for Res. with Beta
4 S&P 500 Without Dividends	All	12.21	2.08	41.14	6.11	16.90	49	(- *) 0.14
	$\beta > 1$	11.03	2.23	22.66	6.11	14.76	21	(- *) 0.53
	$\beta \leq 1$	13.09	1.44	47.95	10.00	16.90	28	(+ *) 0.31
5 Dow 30	All	5.71	1.34	29.72	1.79	8.48	49	(-) 0.06
	$\beta > 1$	5.02	1.56	14.73	1.79	8.40	21	(-) 0.00
	$\beta \leq 1$	6.23	0.87	37.87	4.20	8.48	28	(+ *) 0.13
6 Unweighted NYSE Index	All	-9.49	4.55	-14.61	-19.74	2.41	1	(+) 0.00
	$\beta > 1$	-7.86	5.37	-6.71	-16.37	2.41	1	(+) 0.00
	$\beta \leq 1$	-10.72	3.43	-16.52	-19.74	-3.08	0	(- *) 0.42

Table 3-3 (Continued)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Case	Funds	Mean Res.	Std. Dev.	t Ratio	Min Res.	Max Res.	N > 0	R^2 for Res with Beta
7 Min t Value = 1.0	All	1.20	4.32	1.95	-7.23	12.37	30	(- *) 0.37
	$\beta > 1$	-0.74	2.47	-1.36	-3.76	4.41	9	(+) 0.02
	$\beta \leq 1$	2.66	4.85	2.90	-7.23	12.37	21	(- *) 0.48
8 Min t Value = 1.6	All	1.36	6.06	1.57	-14.85	15.67	29	(- *) 0.19
	$\beta > 1$	-0.30	4.53	-0.30	-7.77	12.57	10	(+) 0.10
	$\beta \leq 1$	2.61	6.80	2.03	-14.95	15.67	19	(- *) 0.40
9 ** 36-Month Horizon	All	-1.50	12.85	-0.82	-37.23	30.85	22	(+ *) 0.17
	$\beta > 1$	1.12	6.43	0.78	-10.81	16.94	12	(-) 0.00
	$\beta \leq 1$	-3.31	15.71	-1.13	-37.23	30.85	10	(+ *) 0.30

** Based on 1963 - 1971 period.

Table 3-4

Fee Plan 2 Sensitivity Analysis: Average Fee Ratios

$RESIDUAL_j[I] = FEE_j[I] - FEE_j[BASE]$

1961 - 1971

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Case	Funds	Mean Res.	Std. Dev.	t Ratio	Min Res.	Max Res.	N > 0	R^2 of Res with Beta
1 Zero Expenses	All	-1.17	0.11	-75.53	-1.54	-1.00	0	(-) 0.01
	$\beta > 1$	-1.18	0.14	-38.06	-1.54	-1.00	0	(-) 0.07
	$\beta \leq 1$	-1.15	0.07	-84.02	-1.29	-1.01	0	(+) 0.10
2 Double Expenses	All	1.48	0.11	93.32	1.26	1.78	49	(-) 0.01
	$\beta > 1$	1.47	0.14	49.72	1.26	1.78	21	(+) 0.01
	$\beta \leq 1$	1.49	0.09	87.36	1.31	1.66	28	(-) 0.02
3 Fiscal Year End	All	1.53	2.41	4.44	-3.93	7.07	37	(+) 0.02
	$\beta > 1$	2.22	3.12	3.26	-3.93	7.07	15	(-) 0.00
	$\beta \leq 1$	1.01	1.56	3.41	-2.16	4.36	22	(-) 0.01

* Significant at 5% level.

Table 3-4 (Continued)

Case	Funds	(1) Mean Res.	(2) Std. Dev	(3) t Ratio	(4) Min Res.	(5) Max Res.	(6) N > 0	(7) R^2 of Res. with Beta
4 S&P 500 Without Dividends	All	11.29	3.33	23.72	0.74	16.74	49	(+ *) 0.68
	$\beta > 1$	13.16	1.61	37.52	10.49	15.84	21	(+) 0.02
	$\beta \leq 1$	9.88	3.61	14.49	0.74	16.74	28	(+ *) 0.92
5 Dow 30	All	2.52	2.93	6.02	-4.93	8.67	40	(-) 0.00
	$\beta > 1$	1.74	3.46	2.31	-4.93	8.27	14	(-) 0.01
	$\beta \leq 1$	3.10	2.36	6.95	-2.07	8.67	26	(+) 0.14
6 Unweighted NYSE Index	All	-6.27	4.06	-10.82	-16.52	0.82	2	(- *) 0.25
	$\beta > 1$	-7.48	4.49	-7.63	-16.52	-0.21	0	(-) 0.13
	$\beta \leq 1$	-5.36	3.51	-8.08	-11.07	0.82	2	(- *) 0.37

Table 3-4 (Continued)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Case	Funds	Mean Res.	Std. Dev.	t Ratio	Min Res.	Max Res.	N > 0	R^2 of Res. with Beta
7 Min t Value = 1.0	All	-1.08	3.03	-2.50	-8.07	6.56	17	(-) 0.00
	$\beta > 1$	-0.84	3.39	-1.14	-7.88	6.56	8	(+) 0.04
	$\beta \leq 1$	-1.26	2.79	-2.39	-8.07	5.43	9	(-) 0.08
8 Min t Value = 1.6	All	-1.75	4.77	-2.57	-13.64	10.82	14	(+) 0.30
	$\beta > 1$	-0.81	4.83	-0.77	-10.91	10.82	7	(+) 0.06
	$\beta \leq 1$	-2.45	4.68	-2.77	-13.64	9.59	7	(-) 0.09
9 ** 36-Month Horizon	All	1.96	11.73	1.17	-31.75	29.49	29	(+) 0.06
	$\beta > 1$	2.92	5.98	2.19	-8.48	14.73	12	(+) 0.00
	$\beta \leq 1$	1.29	14.51	0.48	-31.75	29.49	17	(+) 0.11

** Based on 1963 - 1971 period.

Table 3-5

Fee Plan 1 Sensitivity Analysis: Fee Ratio Standard Deviations

$$RESIDUAL_j[I] = FSD_j[I] - FSD_j[BASE]$$

1961 - 1971

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Case	Funds	Mean Res.	Std. Dev.	t Ratio	Min Res.	Max Res.	N > 0	R^2 for Res with Beta
1 Zero Expenses	All	0.06	0.14	3.23	-0.18	0.36	29	(+ *) 0.40
	$\beta > 1$	0.18	0.13	6.12	-0.17	0.36	20	(-) 0.03
	$\beta \leq 1$	-0.02	0.07	-1.61	-0.18	0.13	9	(+ *) 0.46
2 Double Expenses	All	-0.07	0.19	-2.58	-0.47	0.21	22	(- *) 0.39
	$\beta > 1$	-0.23	0.17	-6.00	-0.47	0.21	1	(+) 0.03
	$\beta \leq 1$	0.05	0.08	3.48	-0.12	0.20	21	(- *) 0.35
3 Fiscal Year End	All	8.98	4.75	13.22	0.05	20.53	49	(-) 0.00
	$\beta > 1$	9.43	5.27	8.20	1.59	20.53	21	(+) 0.02
	$\beta \leq 1$	8.65	4.40	10.40	0.05	20.09	28	(-) 0.10

* Significant at 5% level.

Table 3-5 (Continued)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Case	Funds	Mean Res.	Std. Dev.	t Ratio	Min Res.	Max Res.	N > 0	R^2 of Res. with Beta
4 S&P 500 Without Dividends	All	-1.09	1.20	-6.40	-4.39	1.12	5	(- *) 0.17
	$\beta > 1$	-1.85	1.40	-6.07	-4.39	1.12	2	(+) 0.01
	$\beta \leq 1$	-0.52	0.55	-5.03	-1.82	0.28	3	(-) 0.00
5 Dow 30	All	2.53	2.89	6.14	-4.26	8.57	40	(+) 0.04
	$\beta > 1$	1.88	1.80	4.79	-0.68	6.92	18	(- *) 0.24
	$\beta \leq 1$	3.02	3.44	4.64	-4.26	8.57	22	(+ *) 0.63
6 Unweighted NYSE Index	All	9.38	12.32	5.33	-19.88	36.03	37	(- *) 0.27
	$\beta > 1$	0.06	10.90	0.02	-19.88	20.46	10	(- *) 0.18
	$\beta \leq 1$	16.37	7.96	10.88	-7.49	36.03	27	(+) 0.05

Table 3-5 (Continued)

Case	Funds	(1) Mean Res.	(2) Std. Dev.	(3) t Ratio	(4) Min Res.	(5) Max Res.	(6) N > 0	(7) R^2 of Res. with Beta
7 Min t Value = 1.0	All	-7.46	3.46	-15.11	-18.09	-1.81	0	(+) 0.03
	$\beta > 1$	-7.60	3.18	-10.93	-14.76	-2.15	0	(- *) 0.49
	$\beta \leq 1$	-7.36	3.70	-10.52	-18.09	-1.81	0	(+ *) 0.51
8 Min t Value = 1.6	All	-12.39	5.51	-15.73	-27.35	-3.68	0	(-) 0.05
	$\beta > 1$	-14.42	6.34	-10.43	-27.35	-7.01	0	(- *) 0.55
	$\beta \leq 1$	-10.87	4.32	-13.31	-20.60	-3.68	0	(+ *) 0.34
9 ** 36-Month Horizon	All	11.20	6.66	11.77	-1.68	30.92	47	(+ *) 0.09
	$\beta > 1$	13.27	7.19	8.25	-1.68	30.92	19	(-) 0.08
	$\beta \leq 1$	9.78	5.99	8.80	-0.40	21.94	28	(+ *) 0.17

** Based on 1963 - 1971 period.

Table 3-6

Fee Plan 2 Sensitivity Analysis: Fee Ratio Standard Deviations

$$RESIDUAL_j[I] = FSD_j[I] - FSD_j[BASE]$$

1961 - 1971

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Case	Funds	Mean Res.	Std. Dev.	t Ratio	Min Res.	Max Res.	N > 0	R^2 for Res. with Beta
1 Zero Expenses	All	0.13	0.19	4.81	-0.63	0.42	43	(+ *) 0.24
	$\beta > 1$	0.25	0.23	5.13	-0.63	0.42	20	(+) 0.01
	$\beta \leq 1$	0.03	0.05	3.54	-0.06	0.14	23	(+) 0.04
2 Double Expenses	All	-0.16	0.23	-4.77	-0.53	0.68	9	(- *) 0.28
	$\beta > 1$	-0.32	0.26	-5.57	-0.53	0.68	1	(-) 0.02
	$\beta \leq 1$	-0.03	0.06	-2.65	-0.15	0.11	8	(-) 0.01
3 Fiscal Year End	All	8.41	5.11	11.52	0.88	24.38	49	(+ *) 0.09
	$\beta > 1$	10.21	5.26	8.89	0.88	24.38	21	(+) 0.05
	$\beta \leq 1$	7.06	4.64	8.05	1.25	23.59	28	(+) 0.00

* Significant at 5% level.

Table 3-6 (Continued)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Case	Funds	Mean Res.	Std. Dev.	t Ratio	Min Res.	Max Res.	N > 0	R^2 of Res. with Beta
4 S&P 500 Without Dividends	All	-1.55	1.76	-6.15	-5.12	3.47	12	(- *) 0.40
	$\beta > 1$	-2.83	1.79	-7.25	-5.12	3.47	1	(-) 0.07
	$\beta \leq 1$	-0.58	0.94	-3.27	-2.36	0.68	11	(- *) 0.18
5 Dow 30	All	6.61	3.97	11.66	-4.34	18.99	47	(+) 0.02
	$\beta > 1$	5.62	3.17	8.13	-0.84	10.58	20	(+) 0.07
	$\beta \leq 1$	7.35	4.39	8.87	-4.34	18.99	27	(+ *) 0.34
6 Unweighted NYSE Index	All	2.76	9.42	2.05	-23.43	25.92	33	(- *) 0.13
	$\beta > 1$	-2.63	8.58	-1.40	-23.43	10.15	9	(-) 0.09
	$\beta \leq 1$	6.80	7.99	4.50	-15.59	25.92	24	(+) 0.04

Table 3-6 (Continued)

Case	Funds	Mean Res.	Std. Dev.	t Ratio	Min Res.	Max Res.	N > 0	R^2 of Res. with Beta
7 Min t Value = 1.0	All	-4.37	2.49	-12.27	-10.29	0.02	1	(- *) 0.33
	$\beta > 1$	-5.79	2.39	-11.09	-10.29	-1.22	0	(-) 0.09
	$\beta \leq 1$	-3.31	2.02	-8.66	-7.60	0.02	1	(- *) 0.15
8 Min t Value = 1.6	All	-9.29	5.04	-12.90	-21.36	-1.23	0	(- *) 0.39
	$\beta > 1$	-12.33	4.66	-12.12	-21.36	-4.34	0	(- *) 0.29
	$\beta \leq 1$	-7.01	4.07	-9.12	-18.03	-1.23	0	(-) 0.12
9** 36-Month Horizon	All	12.22	7.09	12.07	1.15	30.82	49	(-) 0.01
	$\beta > 1$	13.71	7.08	8.66	1.15	30.82	20	(+) 0.00
	$\beta \leq 1$	11.19	7.03	8.58	1.25	28.63	29	(- *) 0.25

** Based on 1963 - 1971 period.