THE
GROUP

summary of proceedings

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VOLUME 3
Now in Our Twenty-sixth Year
THE Q GROUP
summary of proceedings
THE INSTITUTE FOR QUANTITATIVE RESEARCH IN FINANCE

VOLUME 3
Indexed for the years 1976-1990

SUMMARY OF PROCEEDINGS
PREPARED AND EDITED BY
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PROFESSOR OF BUSINESS ADMINISTRATION
THE AMOS TUCK SCHOOL
DARTMOUTH COLLEGE
SUMMARY OF PROCEEDINGS
Preface to Volume 3

Welcome to Volume 3 of The Q Group's Seminar Summaries. This latest volume brings together seminars given during the period 1986 through 1990. To enhance the usefulness of this and other summary volumes, we have indexed all three volumes herein. Thus, under one heading you will find all the references concerning particular subjects dating back to 1976. Should you have misplaced or not received the prior volumes, please let us know. We would be pleased to provide copies to you and your associates as part of our ongoing support of sponsors.

No Q document can be published without acknowledging the invaluable and unique contributions of Dr. J. Peter Williamson. Since 1976, Peter Williamson, Professor of Business Administration at The Amos Tuck School at Dartmouth College, has provided Q with the excellent summaries of our semi-annual seminars. These individual summaries have provided an important cohesive record of the meetings as well as a readable distillation of the main points contained in the presentations. In many instances, Dr. Williamson's efforts have provided the audience with the key perspective that links financial theory with the practical world in which our sponsors work day-to-day. These individual seminar summaries, dating back to 1976, cross and recross many financial research areas of continuing interest to our sponsor organizations. It became evident that a compendium of these individual summaries, organized by subject matter would be of value to our sponsor members. Thus, Volumes 1 and 2 of our Summaries of Proceedings were published in 1983 and 1986, respectively.

For those of you who are unfamiliar with the Institute, now in its 26th year of operation, let me provide a brief overview of its structure and activities. The Institute for Quantitative Research in Finance (also called the Q Group) is a specialized non-profit professional organization that has as its prime purpose helping its sponsors stay abreast of the latest developments in theoretical finance that impinge upon investment management practice. In many instances, The Q Group membership has actively participated in the development of new techniques and their application. Currently, there are over 80 sponsor organizations in the Q Group from a broad range of financial institutions, public and private pension funds, consulting firms and university endowment funds. The Q Group conducts seminars twice each year, funds research projects and periodically distributes research papers to its sponsor organizations. The seminars provide Q Group sponsors with the research results of practitioners in the field as well as those of the academics representing the world's leading graduate business schools. In addition, the results of research funded by The Q Group are presented to the seminar audiences.

The Q Group concept has begun to expand beyond the confines of the United States. In 1987 The Institute for Quantitative Investment Research (INQUIRE) was founded in the United Kingdom and in 1991 a separate Institute in Europe also called INQUIRE was initiated. INQUIRE United Kingdom, following the same seminar research and corporate membership format, now has 45 sponsor organizations and has held regular spring and fall seminars. INQUIRE Europe held its first fall seminar in Berlin in 1990 and held its first joint seminar with INQUIRE United Kingdom in April 1991 at Harrogate in Yorkshire.

In my capacity as Vice Chairman of both INQUIRE United Kingdom and INQUIRE Europe, I have had an unique perspective of Q development. Most recently, the Quantitative International Coordinating Committee (QUICC) has been formed to bring together the activities
of the different regional organizations. The members of QUICC include the Chairman of the United States Q Group, James L. Farrell, Jr., the Chairman of INQUIRE United Kingdom, William A. R. Goodall, the Chairman of INQUIRE Europe, Jan Overmeer, and myself. It is anticipated that the Pacific Rim will soon be added to the mix of Q organizations with headquarters in Hong Kong. The Chairman of this group also will be added to QUICC. An interchange of information between the Q organizations has already occurred through the exchange and distribution of seminar summaries to sponsors worldwide. This is merely the beginning of what is anticipated to be the marriage of Q organizations around the world.

As we have done in past volumes, acknowledgment must be given to the many speakers who labored over their seminar presentations in an effort to communicate effectively with the attendees. The Q Group Program Committee and the Board of Directors must also be recognized for the vital role they have played in this process. I would like personally to thank Roger F. Murray, our esteemed Vice Chairman emeritus, who contributed the lead article in this third volume. His support and continued contribution to Q over 25 years cannot be ignored. Finally, let me express my own personal thanks to Peter Williamson for his superb organizational effort in developing a group of diverse and often difficult topics into a meaningful and highly readable text. Our thanks too, to Tammy Stebbins who prepared the text for the printer.

Our efforts in preparing this text will be well rewarded if you, our readers, find this document to be a valuable addition to your library.

Dale Berman
Secretary Treasurer
The Q Group
New York, NY
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THE Q-GROUP'S FIRST DECADE
by Roger F. Murray

State of the Art in 1966

A brief review of the state of the investment decision-making art in 1966 is useful to place the start of the Institute in its intellectual and operational environment.

Prior to the beginning of 1966, we had the benefit of the new insights of Sharpe,Lintner, and Mossin. Implications of the Capital Asset Pricing Model were not widely understood but its tenets were clearly established. Compustat and the University of Chicago's Center for Research in Security Prices data bases had recently become available to stimulate empirical research. The SEC's Special Study of Securities Markets had been presented and debated. The random movement of stock prices had been effectively explicated by Paul Cootner at al.1 David Durand had long since made his presentation of the Petersburg Paradox in growth stock valuation as interest had arisen in the euphoria of the early 1960s.2

There was, in short, the strong stimulus of new concepts in the field of investment management. Both the 1958 revaluation of corporate earnings power and the 1962 stock market correction had stirred interest in the search for meaningful portfolio theory and disciplined decision-making processes. An early response had been made by individuals like Whitbeck and Kisar3 but theirs was not representative of practitioners' thinking, despite the efforts of the Financial Analysts Journal's line editor, Nicholas Modolovsky. Wide gaps between theory and application were highly visible. The role of quantitative analysis of finance was so much in dispute that President Fred Weston commented at a stormy membership meeting on the "increased evidence of divisions of opinion among the members of the American Finance Association concerning the content and emphasis of financial research and teaching." He observed that "we now have at our command improved techniques for formulating models, improved tools for observation, for gathering data, and for careful statistical testing of alternative propositions. The older methodologies are useful for suggesting hypotheses and propositions, but inadequate for the systematic formulation of models and their testing.4

Despite the disparity in perspectives on the discipline, there were several instances of common interests bringing academic research and investment management together. One of these was asset management performance measurement. The year 1966 was especially fruitful. Articles by Jack Treynor5, Bill Sharpe6, Peter Dietz7, and Peter Williamson8 addressed the Dietz book9 and other aspects of the subject. At last, the goal of comparability was in the process of attainment.

Other names especially familiar to Q-Group members were appearing in the literature of 1966. Chuck D'Ambrosio's co-authorship of a business finance volume10 was competing for attention with Burt Malkiel's book on the term structure of interest rates.11 Jim McWilliams was addressing some aspects of the low P/E effect.12 One could read a summary of Marty Gruber's doctoral dissertation on determinants of stock prices.13 Implications for corporate financial policies were identified in further response to the Modigliani and Miller stimulus. There was, then, an increasingly active exploration of both old and new analytic concepts.

The financial environment was not especially favorable. The S&P Index started the year at about 100 and bottomed around 80 in October 1966. Interest rates rose sharply (by prevailing standards) from 4-5/8 to 5-1/2 per cent for AAA corporates and from 4-3/8 to 5-3/8 percent for Treasury bills. This "credit crunch" did not quite produce a recession, but it was a close call. However, the rise in consumer prices was limited to 3 percent. The record volume of stock trading at fixed commissions and good new issue activity produced high levels of prosperity in The Street.

To Dale Berman at Goodbody & Company, the huge gap between the challenging themes of academic research and the generally accepted levels of their application presented a striking opportunity. In addition, Dale Berman headed a department at Goodbody that was considered one of the leaders in the practitioner movement in the field of quantitative applications at that time. For many years, Berman acted in the program, in research, and as an interface with the academic community in an attempt to assure the Institute's success.
Goodbody interest was expressed in its substantial subsidy of the startup of the Institute.

Some Major Research Themes

During the first decade of the Q-Group, many themes were explored, studied in depth, and discussed at Seminars. Just a few were so persistently addressed that they are briefly mentioned here.

Earnings Estimates:

Some sponsors were already studying the accuracy of analysts' earnings estimates and their role in share pricing. These sponsors provided data to Dale Berman, who assembled the material into a useful data base for Professors Malkiel and Quandt, who were especially interested in this topic and made early presentations of their findings. So interesting was the subject that it was on center stage periodically for a dozen years, leading to the Elton and Gruber more extensive study of IBES data.

Valuation:

The many aspects of valuation and risk measurement were addressed by Alex Robichek, Will Baumol, Elton and Gruber, Will Carleton, and a host of others. They closely examined valuation models and their implications for decision-making. Quantitative testing was giving rise to refinements in both formulation and restatement. Interest in this central topic never lapsed.

Factors affecting security prices were also studied in the endless search for better forecasting methods. Economic, monetary, industry, and market liquidity influences on equity valuation were the topics of a wide range of studies. One experiment was to obtain the fresh insights of a trained econometrician, in this case Professor Cunyngham, who was unencumbered with accepted principles of finance.

Options:

With only the dealer market in options available for study in the days before the opening of the Chicago Board Options Exchange, research on option pricing was in its infancy. Malkiel and Quandt did, however, have access to extensive data from that dealer market. One of the most intriguing questions for many of us was whether dealers had valuable insights into the prospects for individual equities or for the market in general. Careful analysis produced a negative answer. The dealers apparently made money from their spreads, not from superior perception of stock price trends.

This early interest in the option market was, of course, excellent preparation for a sustained research program relating to contingent claims. The Malkiel and Quandt 1969 book on options, with its acknowledgement of Q-Group support, was the first of many studies of this new market.

International Investing:

In 1971, interest in international equity portfolio diversification was very limited outside of the Q-Group. The subsequent series of sessions, in which Don Lessard was an active participant, were a good example of the ability to identify early an important field for exploration in depth. Because of the long transition period between germination of the concept and its widespread adoption in asset management, there was ample time for fruitful research studies.

Pension Funds:

Public and private pension funds stimulated interest not only because of their size and growth but also because of the emerging perception that the structure of liabilities was relevant to portfolio objectives. With the added emphasis on the prudent expert under ERISA, sponsors were ready to take a fresh look at the conventional wisdom of the preceding two decades. This brought a number of fresh faces to the speaker's rostrum.

Bond Portfolio Management:

Persistent interest in bond portfolio management successfully, on occasion, competed with the glamour of equity investing. Malkiel, Carleton, and Fama were wringing the last drop of guidance from the term structure of interest rates. Williamson was sorting out bond management strategies and Marty Leibowitz was presenting the first of his many informative slide shows. The opening of this field of asset management to the discipline of performance measurement has been slow in achievement and imprecise in its criteria; the time was ripe for change. The rediscovery of the duration concept, immunization, and international
diversification were mostly in the future, but the surge of interest was unmistakable.

**Corporation Finance:**

The original concept of the Institute assumed that enough of the content would be of interest to engage the sponsorship of corporate financial staffs. Early programs addressed cost of capital, capital budgeting, dividend policy, and capital structure policy questions. Original sponsors included companies like ITT, Union Carbide and Standard Oil of Indiana and others were approached. Inevitably, however, investment management types dominated the programs and choices of topics. All in good spirit, the conclusion was reached that corporate financial policies were for another day or at least for another group. The nonfinancial corporations which became and stayed as members were those whose pension and investment programs engaged their attention and active management.

**Portfolio Management:**

Central to most topics, of course, were portfolio theory and portfolio management. Sharpe, Brealey, and Blume were among those providing fresh thinking about old topics. The incessant challenge to both accepted doctrine and intuitive judgments was a principal nourishment to participants which was not universally shared by bean counters, expense control experts, and budget preparers.

The capital markets of 1973-1974 were so devastating to investment managers (with the exception of the firm that rode through the period in Treasury bills to oblivion) that quantitative research in finance barely survived. Participants did not lose interest; they simply could not get budget approval in many cases. A significant membership shrinkage at $3,000 per sponsor organization seemed to suggest that it was time to dissolve, but a few of us took to the road and we turned the corner in 1975. We learned that the membership of a competitor can be more persuasive than the sheer merit of the program.

It is fair to say that quantitative methods had become more than an academic eccentricity, had been integrated into a number of successful asset management styles, and had achieved recognition among a new generation of rising stars. Survival of the Institute through this period of adversity was a sign of the times to which, of course, the participants had themselves contributed. The subsequent problem of a waiting list for membership reflects the adoption of portfolio management concepts no longer in the realm of the optional.

**Self Examination:**

Sponsors consistently showed a keen interest in the state of the art and potential lines of inquiry, seeking to avoid both duplication of other efforts and ignorance of emerging issues. This was reflected in the Tuck School bibliography and especially in Dick Brealey’s comprehensive study of the field. The research program was a constant source of new ideas and few significant topics were overlooked, even if resources and time did not permit study in depth. As would be expected of this kind of active group, there was no shortage of frank criticism of research directions to sustain a process of constructive self examination.

**A Unique Structure**

The Institute’s initial Board consisted of the representatives of

- Chase Manhattan Bank
- College Retirement Equities Fund
- Fidelity Management & Research
- Goodbody & Co.
- INA (Philadelphia Investment Co.)
- Scudder Stevens & Clark
- Standard Oil Co. of Indiana

This group of individuals working together created a structure for research and program that was neither academic nor an attempt to sell products.

At the outset, an affiliation with a university seemed like a good idea and this was almost a traditional arrangement. Princeton was a likely candidate and Burt Malkiel knew about investment management from having worked in The Street. Will Baumol and Dick Quandt were capable colleagues and a commonality of interests was evident.

Through the first four years, the arrangement was highly productive, but it became increasingly evident that the Princeton group was likely to dominate the direction of both the emphasis and the content of the Institute’s program, despite formal ties with the Tuck School, the Stanford Business School and Ohio State University. For strong-minded
officers and directors, which were in ample supply, this was not an acceptable outcome. Rather, the sponsors determined to keep full control of the direction of both topics and research projects. The arrangement then made with The Columbia Business School was one in which the university provided certain facilities and administrative services but the program and research committees made the decisions about the allocation of resources.

Perhaps because of the initial experience with an alternative form of structure, the Institute became almost unique for this kind of undertaking in choosing to make virtually all of its own decisions. Whatever the deficiencies of such an anarchistic design, the learning experiences of the first decade were productive of real accomplishments. A sponsor-dominated research group, free of outside direction, could and did have the freedom to explore a wide range of topics. The brainchildren of all members of the group were eligible for consideration, with the assumption that no one person knew best on all subjects.

The minimal roles of structure, procedures, and rules meant reliance on people and their judgment. An indefatigable Secretary-Treasurer, in the person of Dale Berman, supplied most of whatever structure was absolutely essential. A large number of interested individuals provided vitality and intellectual motive power to the Institute. All of us know and have argued with these individuals and it would be impossible to do justice to the contributions of each one of them. One can, however, identify an example. he is Jack Treynor, a contributor to a wider range of topics than anyone else, frequently insightful on abstruse subjects and on occasion abstruse on fresh insights. Jack's diversity of interests and skills continue to challenge our narrow views of our discipline. Jack exemplifies the attributes of the Q-Group that were nurtured in its first decade and continue to give it vitality.

FOOTNOTES


4 Discussion at annual meeting of the American Finance Association.


BONDS - DURATION AND IMMUNIZATION

1. IMMUNIZED PORTFOLIOS AND DYNAMIC ASSET ALLOCATION
(Spring, 1986)

Eric Pang, Assistant Director of Research, Gifford Fong Associates, introduced the subject of portfolio protection. Protection involves altering the distribution of rates of return on a portfolio. A number of investors may wish to achieve a distribution that offers a specified minimum return. There are various ways of achieving this minimum. Immunization is one, but this is a passive strategy that locks in a particular rate of return and prevents exploitation of the return possibilities on a risky asset. Contingent immunization offers more flexibility, but once the immunization is put in place, there can be no further benefit from exploiting a risky asset.

Pang observed that dynamic allocation provides for a minimum guaranteed return, but never cuts off the exposure to upside performance of the risky asset. At the same time, the minimum guaranteed return will be less than the rate that could be locked in initially through immunization.

Dynamic asset allocation involves constant (or at least frequent) rebalancing of the portfolio at least between two assets, over the period to the time horizon, rather than a one-time asset allocation. And dynamic allocation relies upon the same data the option pricing model requires. It is not necessary to specify expected returns and risks as in the case of static asset allocation. Only volatility and correlation estimates are required.

Dynamic asset allocation seeks essentially to replicate the distribution of rates of return for a put protected portfolio. The put call parity theorem tells us that the return on a stock portfolio protected with put options is the same as the return on a portfolio consisting of cash and call options. So the distribution to be replicated is the distribution of returns for a call option. Pang illustrated graphically the familiar relationship between the value of a call option and the price of the underlying security. The slope of the curve tracing out the value of the call option becomes the hedge ratio and in the dynamic asset allocation process this hedge ratio translates into the proportion of the target asset that should be held in the portfolio. The hedge ratio changes with every change in the price of the target asset, and it also changes over time. So in principle, rebalancing should be continuous. However, there is a cost associated with rebalancing and some tradeoff must then be achieved between tracking accuracy and low or minimum transaction costs.

Oldrich Vasicek, Senior Research Consultant, Gifford Fong Associates, continued the presentation and described a number of extensions of portfolio insurance strategy. He pointed out first that if the investor is willing to establish a maximum rate of return, the cost of insurance can be reduced. In the simple case, where there is no specified maximum, the portfolio return is represented by:

\[ R_p = \max(R_T - C, R_{min}) \]

where
\[ R_p = \text{portfolio return} \]
\[ R_T = \text{return on risky or target asset} \]
\[ C = \text{cost of insurance} \]
\[ R_{min} = \text{minimum guaranteed return} \]

In the case where a maximum return is specified, the following relationship holds:

\[ R_p = \min(\max(R_T - C', R_{min}), R_{max}) \]

\[ C' < C \text{ and can be negative} \]

The return from the portfolio will in this case lie somewhere between \( R_{max} \) and \( R_{min} \), and the cost of insurance will be reduced. The insurance cost can even be negative, if \( R_{max} \) is low enough. This means that over the range from \( R_{min} \) to \( R_{max} \) the portfolio return will be higher than the return on the target asset. Vasicek showed in tabular form the insurance costs for a range of specified minimum and maximum returns.

Vasicek next showed the results of a simulation, with the S & P 400 Stock Index as the target asset and an immunized portfolio as the safety asset, for April 1986 through October 1988. Since rebalancing was to take place monthly and not continuously, one would not
expect results to coincide precisely with the scheduled or theoretical results for continuous rebalancing. But the actual simulated results were very close.

He next moved to multiple asset examples, where the rate of return on the portfolio, consisting of \( m \) assets, is represented by:

\[
R_p = \max(R_1 - C_1, R_2 - C_2, \ldots, R_m - C_m)
\]

In this case, there is an insurance premium paid for each target asset. These premiums need not be the same, and Vasicek showed that one would probably be willing to pay substantial premiums for assets that are relatively unimportant but might turn in spectacular performances, while preferring to keep at a modest level the insurance premiums on the assets used most heavily. One of the \( m \) assets could be an immunized portfolio, in which case there would be a guaranteed minimum return.

The results for a number of two-asset portfolios were presented in tabular form. And once again, the actual returns, with monthly rebalancing, were very close to the scheduled returns. In general, the actual return was within a half percent of the scheduled return, with a transaction cost of about a quarter of one percent.
BONDS - QUALITY AND RISK

2. LEVERAGEABILITY OF CORPORATE ASSETS (Fall, 1989)

The presentation was given by Martin L. Leibowitz, Managing Director, Eric Lindenberg, Director, and Stanley Kogelman, Vice President of Salomon Brothers. A paper was distributed by these three authors entitled Leverageability of Corporate Assets: A Shortfall Approach to the Creditor's Perspective.

Leibowitz introduced the topic, saying that the key idea behind the methodology to be proposed was taking the creditor's perspective in assessing corporate debt capacity. The presentation was to be organized around five topics: the shareholder's perspective on leverage, the impact of leverage on the firm, the shortfall approach to the creditor's perspective, the shortfall model, and further generalizations. He stressed that the analysis to be put forward was only a small step to increased insight into issues of leverage.

Lindenberg discussed the determination of the level of maximum leverage from the creditor's point of view, and the optimal level of debt determined from the shareholders' point of view. There are various criteria for determining the optimal level of debt, in terms of the greatest value to shareholders. Possible criteria include return on equity, volatility of return on equity, the debt/equity ratio, the price/earnings ratio, the expected long term growth rate and the dividend payout rate. All of these affect value to some extent. In the model to be described, the focus was on the first two: return on equity and volatility of this return.

From the point of view of the creditor, the criteria affecting the limits to leverage might include: the normal level of cash flow, the stability of cash flow, the liquidity of corporate assets, the stability of the asset value, the tax treatment of interest payments, creditor restrictions on operations of the borrower, and the market impact of increased leverage. Lindenberg said there is probably no tractable quantitative model that truly furnishes both the optimal and maximum debt levels. The focus here was on the development of a simple model that would give no complete answers but would provide some useful insights.

The shortfall model determines the maximum leverage in terms of two parameters: the level and the stability of the borrower's cash flow. The starting point is a return on assets (ROA) that is assumed to be independent of capital structure. The return on equity (ROE) is related to the ROA in the following equation:

\[ \text{ROE} = \frac{\text{ROA} - i}{1 - h} + i \]

The parameters \( i \) and \( h \) designate the after-tax interest rate on borrowing and the ratio of debt to total capital. The first term on the right hand side of the equation can be seen as the excess of return on assets over the interest rate to be paid, divided by the equity ratio, and the second term is simply the cost of debt. The standard deviation of the ROE is related to the standard deviation of the ROA by the following equation:

\[ \text{SD}_{E} = \text{SD}_{A} / (1 - h) \]

Stanley Kogelman continued the discussion, introducing a numerical example. We assume that the ROA for a corporation is 14%, with a standard deviation of 9%. And we compare the unleveraged corporation with the same corporation at 25% leverage at an interest rate of 10% before taxes and 6.5% after taxes. For the leveraged corporation, the expected ROE becomes 16.5%, with a standard deviation of 12%. The preceding two equations lead to the following equation for the leveraged corporation:

\[ \text{ROE} = \left[ \frac{\text{ROA} - i}{\text{SD}_{A}} \right] \times \text{SD}_{E} + i \]

The equation above describes a linear relationship between the return on equity (ROE) and its standard deviation (SD_E). The intercept of the straight-line is \( i \) and the slope is \( (\text{ROA} - i) / \text{SD}_{A} \). This line is the "firm line" and represents the return/risk trade-off for the leveraged firm. The firm line simply traces the combinations of expected return and risk that are available for the leveraged corporation. It cannot by itself establish an appropriate or a maximum level of leverage.

To find the maximum leverage, we construct the "shortfall line". We start with a
given interest rate and a given shortfall probability that the lender is willing to tolerate. In our example, the interest rate is 6.5% after taxes, and we assume the lender is willing to tolerate a shortfall probability as high as 10%. In other words, the lender is willing to tolerate a probability of 10% that the return on assets will be insufficient to cover the entire interest obligation. We assume that the interest rate does not rise as leverage increases, but it is clear that the probability of a shortfall rises with leverage. For example, 25% leverage raised the probability of a shortfall from 6% to 8%, still within the 10% limit. The question to be addressed was what degree of leverage would create a 10% risk of a shortfall. Assuming a standard normal distribution, a 10% risk of shortfall corresponds to the return on equity falling 1.282 standard deviations below its mean. This leads to the linear relationship:

\[ \text{Expected ROE} = \text{ROE}_{\text{min}} + 1.282 \times SDE \]

The intersection of the line represented by the equation above (the shortfall line) with the firm line, gives the maximum leverage. In our particular example, that maximum is 37.9%, where \( \text{ROE}_{\text{min}} \) is zero.

Leibowitz took over the presentation at this point to elaborate on the shortfall model. He discussed the use of the firm line and the shortfall line to establish the maximum leverage, and he went on to deal with the leverageability of a hypothetical firm that has two autonomous subunits. One can reallocate assets between the two subunits in such a way as to maximize the leverage of the entire firm in order to increase return to its investors. Leibowitz went a step further, to discuss the use of the model in dealing with multiple layers of debt, where succeeding lenders are willing to advance further funds at higher interest rates.

He closed by discussing strengths and weaknesses of the model. Among the weaknesses, the model considers only one dimension of debt capacity; it does not take advantage of theories of utility and partial moments; it does not provide a derivation of the debt interest rate function, and it assumes a single period analysis. Among the model's strengths are that it is simple and intuitive; it recognizes volatility of EBIT; it can incorporate coverage ratios; it can be applied to an interest rate function; it provides insight into the "optimal" capital structure for the firm; and it reflects benefits to tax-free investors.

3. MORTALITY AND PERFORMANCE OF CORPORATE BONDS -- ANALYZING THE DEBATE (Fall, 1989)

Edward I. Altman, the Max H. Heine Professor of Finance at the Stern School of Business at New York University, distributed a number of tables as well as a paper entitled Mortality and Performance of Corporate Bonds -- Analyzing the Debate.

His task was to review his presentation a year earlier, before the Fall 1988 Q Group Seminar, on high-yield bonds, as well as to discuss some of the ideas put forward in five new studies published within the past year, and to indicate new research he is undertaking.

He began with the traditional method of measuring the default rate in high-yield bonds. Essentially, one takes the market portfolio of these bonds and examines the rate of default in that portfolio over a calendar year. One can then calculate the corresponding rate of return for that market portfolio, net of defaults. It turns out that over the period 1978-88 (11 years) the annual compound average rate of return was 12.1%, 2.41% above the average total return on long-term government bonds. For the first nine months of 1989, the return on the high-yield portfolio was only 5.76%, while the long term government return was 14.69%. Some have considered the negative spread of 8.93% to be an indication that something has gone wrong with high-yield bonds. Altman pointed out, however, that over the preceding decade, there have been years in which the spread was even more negative. The promised yield spread at the present time, that is the yield to maturity for the high-yield portfolio less the yield to maturity for long governments, is around 7%, representing an all-time high.

The default rate for the portfolio of high-yield bonds from 1978 through 1988 has been 1.919%. For the first nine months of 1989, the rate has been somewhat higher at 2.639%. The default loss is a function of the default rate and the average loss in dollars on defaults. For 1988, the default rate was 2.48%, and the default loss was 1.546%. For the period 1974 through 1988, the average annual default loss was 1.162%.

There was a discussion of the appropriate government maturity to compare with junk bonds. Altman indicated that the average duration of junk bonds is about 5 1/2 to
6 years. The duration of long governments is likely to be around 9 years, so one might do better by comparing rates of return on intermediate governments with rates of return on junk bonds.

As he had done at the seminar a year earlier (see summary #6), Altman discussed an alternative method for measuring the default rate. The approach here was to develop a mortality rate for an issue of bonds, identifying the cumulative mortality over one, two, three or more years following the issue. The technique is very similar to the development of mortality rates for human beings. It is of particular interest because it was used by Asquith and others in a paper criticizing Altman's statistics on default losses. The default experience of B rated bonds has a special significance, since the B rating accounts for about 65% of all junk bonds. An analysis of issues from 1971 through 1988 indicated that by the tenth year after issue, about 31% of B rated bonds had gone into default. These results were very similar to those reached by Asquith and his fellow authors. The cumulative losses on B rated bonds at the end of the tenth year had reached about 25%. Altman suggested that the table of cumulative losses might be a useful guide to those wishing to set up loss reserves for a junk bond portfolio.

Up to about four years after issuance, the realized return spread for bonds over governments follows the pattern one would expect. That is, as the quality of the bonds decreases, the realized return spread rises. However, beyond four years the realized return spreads on BB bonds exceed the realized spread on B bonds. And beyond nine years, the realized spread on BBB bonds exceeds the realized spread on B bonds. It does appear that the performance of B rated bonds has been relatively poor.

Altman presented a table based upon the work of Asquith and his co-authors, showing default rates for up to 12 years following the issue year. Asquith had claimed to find an aging effect, with default rates rising over time. The table of default rates, however, did not seem to support this conclusion. Defaults appeared to be clustered, and the work of Blume and Keim, making use of Asquith's data, found that the clustering was explained by the state of the economy. There appeared to be no statistical relationship between aging and default rates after one allowed for economic effects.

4. INSTITUTIONAL INVESTORS' PERSPECTIVE OF THE HIGH-YIELD BOND MARKET (Fall, 1989)

Murali Ramaswami, Senior Vice President, The Travelers Investment Management Company, distributed a paper entitled Institutional Investor's Perspective of the High-Yield Bond Market.

He referred to some earlier presentations at the Seminar that had dealt with high-yield bonds from the point of view of the issuer, and contrasted the focus of his own presentation. His principal concern was with an assessment of the attractions of the high-yield market to institutional investors, and with ways in which those investors might manage the risk in this market.

He reviewed the ownership of high-yield bonds, reporting that insurance companies and mutual funds each account for about 30% of holdings, with pension funds holding 15% and the remaining 25% divided among S&Ls, foreigners, and other investors. Commercial banks are not direct investors in high yield debt, but almost 40% of commercial lending has been going to LBOs. Furthermore, since last July commercial banks are permitted to underwrite corporate bonds, including high-yield bonds.

Perhaps more important, the private placement market is a very close parallel to the high-yield market, and insurance companies are major participants in the private placement market. This means they are accustomed to high risk lending and to ways in which they can deal with the risks. An important motivation for insurance company investment in high-yield bonds has to do with limitations on permissible common stock ownership. For insurance companies, high yield bonds may offer a substitute for common stocks.

A number of studies have appeared within the last year or so, analyzing default rates and default risk in high-yield bonds. Altman had discussed some of these (see the preceding summary), and Ramaswami added a few comments (his paper had done a careful review). The studies represent some disagreement over the degree of default risk and its acceptability. Only one, that by Paul Asquith and two co-authors, seems to have taken the clear position that the risk in high-yield bonds is unacceptable. And this study did not include any rate of return comparisons; it examined only default risk. But while the other studies of historical records
seemed to conclude that the risk in high-yield bonds is an acceptable risk and is justified by rates of return, they had left unanswered the question how the investor in high-yield bonds might fare in a recession. One study, undertaken by DRI in the summer of 1989, had projected the performance of high-yield bonds over the next five years, employing four different recession scenarios. That study had concluded that under the worst scenario — an inflationary recession — high-yield bonds would still perform relatively well compared to alternative securities. The conclusion that Ramaswami drew was that the studies that had been done, looking backward and forward, provided reassurance that the high-yield market offers tolerable risk and attractive returns for the risks taken. He went further, to explore the diversification benefits of high-yield bonds. For an investor in common stocks and high quality corporate bonds, high-yield bonds offer valuable diversification as well as the prospect of an attractive return/risk relationship on their own.

He turned next to ways in which the risk in high-yield bonds might be minimized. His first suggestion was diligent credit analysis of bond issues, and he pointed out that insurance companies buying private placements are already experienced at this kind of analysis.

A technique Ramaswami had tested has to do with the market perception of default. The question to be explored was how long before default does the market seem to perceive that a default is coming. Ramaswami described in his paper a statistical method proposed by Hillmer and Yu to answer the question, and reported on his own results. When he used excess returns as the key parameter in the analysis, he found that the market seems to perceive defaults about 10 months in advance. When he used volatility of excess returns, he found the lead time was about five months. He contrasted this with the much greater lead time (9 to 18 months) for the market perception of impending bankruptcy.

The next methodology he examined for managing credit risk was a proper assessment of default premiums by rating class. As an example, he had estimated the expected risk premiums for various rating classes, assuming very high default probabilities to reflect current concerns with the junk bond market. And he had compared these premiums with the actual spreads available over treasuries. For all of the high risk ratings, his estimated spread was below the actual spreads available. And for the lowest rated class -- CCC -- the actual spreads available were about twice the estimated spreads. That is, there seemed to be ample return available in today's market to cover even conservatively estimated risks.

Next he reported on the testing of hedging strategies. A composite hedging strategy is based upon the proposition that a high-yield bond is a dynamic combination of equity and riskless bonds. In theory, then, it should be possible to hedge the high risk bond with a combination of stock futures and interest rate futures. Ramaswami's experiment, from mid-1985 through mid-1989, suggested that this hedge was not successful. In fact, hedging with interest rate futures alone was more successful. When he tried hedging not a general high-yield bond index but a retail sector high-yield bond index, with retail sector equity futures and treasury futures, he still found the hedge was generally unsuccessful. Finally, he tried hedging a Campeau bond with equity and bond futures, from July through September, 1989. The hedge was reasonably successful until the day in September when the bond lost 20% of its value. On that day the bond dropped and the equity rose.

He tried one more hedging strategy with the Campeau bond. He made use of a buy-write portfolio of stocks and calls. The buy-write portfolio consists of a long position in the stock and a short position in the call. To provide a hedge against ownership of the high-yield bond, these long and short positions are reversed. The result of this hedge was no more successful than the result of the former one. Once again, on the critical day the hedge simply did not protect the investment.

In concluding, Ramaswami observed that high-yield debt is an important investment asset for institutions. History suggests that returns have provided adequate compensation for the default risk taken, but history does not include evidence of market performance under severe economic recession. High-yield bonds offer valuable diversification possibilities. Credit analysis can help to avoid risk and improve performance. There is evidence that the market anticipates an impending default as much as 10 months in advance. This should allow the use of hedging strategies, and a number of hedging strategies are possible. The ultimate goal would be to preserve benefits from persistent inefficiencies in the high-yield market, while protecting against serious loss.
5. PANEL ON HIGH-YIELD BONDS
(Fall, 1989)

Edward I. Altman moderated a panel consisting of Robert Bernstein from Delaware Capital Management, Edward I D’Alelio from the Putnam Companies, Paul Owens from Berkeley Capital Management, and Murali Ramaswami.

Altman began by reporting on one of the studies of the performance of the high-yield bond market, a study that had been mentioned but not carefully described. This was the DRI study released in July, 1989. Altman commented that the study was funded by the Alliance for Capital Access, a Washington-based group representing high-yield issuers. The study took 583 current issuers of high-yield bonds, and began with their end of 1988 balance sheets. Balance sheets and income statements were projected through 1993 under four economic scenarios: a soft landing for the economy, a mild two-quarter recession, a major recession, and an inflationary recession. The projections were made on the assumption that each company would behave exactly as its industry behaved under these scenarios. Each issuer was tested to see if a default would occur before 1993. A default was defined to be four successive quarters of projected negative current assets. For the first three scenarios, a 13% cumulative default rate was predicted, a rate not much different from past defaults. For the inflation recession scenario, a 19% cumulative default rate was projected over the five years. For this scenario, short-term governments, treasury bills and CDs were projected to perform better than high-yield bonds, but high-yield bonds were projected to perform better than another four or five categories of investment securities.

Bernstein spoke about the prospects for high-yield bonds. He said spreads are now in the range 650 to 700 basis points but the market is relatively illiquid. High-yield mutual funds have pulled back a little and there is some fear of media bashing. In recent months we have seen that we do not need a recession to bring about some large corporate failures.

Larger spreads may be a long term feature of the market. Savings and loan capital will have to move away from high-yield bonds, and there may be legislation affecting yield spreads.

D’Alelio discussed the high-yield marketplace. From 1980 through 1982 there was not much supply of high-yield bonds, and only narrow diversification was possible, among airlines, steel companies, and oil and gas. For 1983 through 1985 the market became more mature. Mutual funds and insurance companies entered the market and there was a large new supply to meet the demand. In 1985, however, we saw a cluster of defaults. In the third quarter of 1986 the LTV bankruptcy took place; spreads widened, and there was a decline in new issues of high-yield bonds. In 1987, spreads widened on October 19, but subsequently narrowed again and there was a decline in new issues. Recently, spreads have been widening.

The market today is characterized by remarkably wide diversification possibilities. LBOs have given us the diversification.

Owens offered further observations on the marketplace. Most high yield issues are not related to takeovers, since most takeovers are financed by bank loans. The expanded use of high-yield bonds in the 1980s is the result of bank loans becoming more expensive.

The issue today is whether the expected return on high-yield bonds justifies the risk. The market is not homogeneous, and credit problems are generally industry and issue specific. There is some risk at the present time, however, of all high-yield bonds moving down together.

Illiquidity should not be a problem over time, although it is today. One can generally construct a portfolio with either high or low liquidity.

He said the leverageability study presented earlier by Martin Leibowitz (see summary #2) is a very useful one. The important question is whether individual companies are reasonably leveraged, not whether United States industry as a whole may be overleveraged.

In response to a question, Bernstein said that actively managed high-yield funds have done much better than the indexes over the past seven or eight years. But he predicted increased volatility in performance.

In response to a question about the role of mutual funds in the high-yield bond market, D’Alelio responded that these funds are sold to
people who demand high income. They are not likely to abandon their high-yield funds easily. In addition, the load funds have the assistance of a broker-dealer network in difficult times.

6. MEASURING CORPORATE BOND MORTALITY AND PERFORMANCE
(Fall, 1988)

Edward I. Altman, Max L. Heine Professor of Finance, Chairman MBA Program, Stern School of Business, New York University, distributed a paper entitled *Measuring Corporate Bond Mortality and Performance*.

He introduced his work with reference to the classic Hickman study, published in 1958, and comments on methodologies that have been used to examine default experience with fixed income instruments, the measurement of default risk, and comparisons of risk with return. In this study, Altman had undertaken a different approach to default experience in corporate bonds. The approach measures the mortality and survival of bonds in a manner similar to the actuarial approach to human mortality and survival. Altman worked with data for corporate bonds covering the risk spectrum from AAA to CCC over the period 1970-87.

Altman's methodology began with the calculation of the annual default rate for a particular rating category of bonds. This rate is the dollar amount of defaults during the year divided by the dollar amount of outstanding securities in the rating class at the beginning of the year. Past practice has been to calculate the annual default rate not for each bond rating but for low rated bonds as a class. And then it has been customary to average the annual default rates over a series of years. For example, for the period 1970-1987, the average annual default rate for low quality straight debt was 2.4% per year. Altman pointed out that the default rate does not measure the default loss. Investors generally achieve some recovery even on defaulted bonds. He demonstrated the calculation of the loss rate, using the default rate and a measure of principal loss and coupon loss on defaulted bonds. The average junk bond investor lost 1.24% per year over the last 15 years, and 1.6% per year over the last 4 years, due to defaults. Since the yield spread for junk bonds over treasury bonds ranged from 350-450 basis points, a net positive spread remained for these junk bonds.

His analysis started with the traditional annual default rate, which he termed the marginal mortality rate. For example, he took the AAA new issues of 1971, and traced the annual default rate for this cohort of bonds year by year through 1987. He proceeded similarly for AA, A, BBB, BB, B, and CCC bonds for the years 1971-1986. For each bond rating he then had an annual default rate for the first, second, third, and so on up to tenth year after issuance. From the annual default rates, he computed cumulative mortality rates. For AAA rated bonds, for example, the cumulative mortality at the end of five years was 0.00%, while that for BBB bonds was 0.91%, for B bonds 11.53%, and for CCC bonds 31.17%. Ten years after issuance, the cumulative default rates were, for the same rating classes, 0.13%, 2.12%, 31.91%, and not available for the CCC bonds.

He then combined the cumulative mortality experience with data on recoveries from defaulted bonds, to calculate cumulative loss experience. The end result was a table showing the realized return spread on net investment in corporate bonds over risk free government bonds, by rating category and for one through ten years after issuance. The returns incorporated actual long-term U.S. treasury coupon rates, yield spreads at issuance for the different rating categories, loss due to defaulted debt, and the reinvestment of cash flows from the sale of defaulted debt at the prevailing interest rate for the bond rating group. Ten years after issuance, for example, the realized return spreads for AAA, AA, A, BBB, BB, and B rated bonds were 12.45%, 20.28%, 28.85%, 45.77%, 76.37%, and 44.67%. Up to about five years after issuance, B rated bonds produced the highest return spread but in later years the spread dropped below that for BBB bonds.

In Altman's opinion, the performance of BB rated bonds had been quite impressive. He observed, however, that liquidity risk may increase with lower bond ratings. He also pointed out that his analysis does not take any account of interest rate risk and this risk may not be uniform over all rating groups.

There was considerable discussion of the significance of Altman's results. The implications of liquidity and interest rate risk are difficult to identify. And some participants argued that even in the absence of such risks, Altman's final result was not inconsistent with an efficient bond market.
7. BOND MARKET VOLATILITY: CAUSE AND EFFECT (Fall, 1987)

Laurence Weiss, Vice President, Goldman, Sachs & Co. opened the presentation by indicating that the focus of the research being reported was on the effect of changes in bond volatility on the shape of the yield curve. He discussed the importance of the phenomenon of convexity in relating price changes in a bond to changes in yields. Convexity, which is the second derivative of price to yield, is beneficial to bond investors. The benefits of convexity arise with volatility, so one might expect that through convexity changes in volatility would show up in bond price changes and therefore in changes in the shape of the yield curve.

Weiss referred to the Merton/Vasicek model, relating yield to maturity on a zero coupon bond to the short interest rate, the slope of the yield curve, and the volatility of yields. Applying the model, he showed the shift in the yield curve that one might expect to accompany an increase in volatility from 200 basis points to 250 basis points per year. He also compared fitted and actual yield curves, showing that the model has worked quite well at some times and not at all well at other times.

He moved next to a logarithmic random walk model and showed the expected changes in the yield curve for changes in volatility. And he demonstrated the difference between the impact of a shift in volatility expected to be permanent from one that is expected to be temporary.

Robert Litterman, Vice President of Goldman, Sachs & Co. continued the presentation, discussing methodology for forecasting changes in volatility. Regressions of predicted on actual volatility have shown quite high values for R squared, suggesting that the forecasting methodology has been quite successful. In addition, regressions of volatility on volatility lagged one month are encouraging.

Litterman went on to discuss a factor analysis methodology that has resulted in identification of changes in volatility as a factor determining the shape of the yield curve. Separating changes in the level of a yield curve from changes in the shape, reveals that 25% of the shape change can be attributed to volatility change.

8. HIGH YIELD PORTFOLIOS REVISITED (Spring, 1986)

Professor Krishna Ramaswamy, The Wharton School, University of Pennsylvania, reported the results of research supported by the IQRF. He began by describing the reasons for expecting high yield portfolios of stocks to produce higher pre-tax rates of return than low yield portfolios, together with some of the research that has already been done on this topic. The differential between the tax rates on dividend income and capital gains for taxable investors suggests that these investors, seeking equivalent after tax rates of return on stocks with equivalent risk, will accept lower pre-tax rates of return on stocks that pay off in the form of capital gains than on stocks that pay off in the form of dividends. There are further complications in the effects of taxes, including the dividends received deduction of 85 percent that is available to corporate investors. One might expect that in the marketplace, differences in the pre-tax returns on high yield and low yield stocks would be affected by arbitrage opportunities where taxpayers may succeed in arbitraging away some of the differential.

Some of the past research has been aimed at trying to distinguish pre-tax rates of return on low yield stocks from pre-tax rates of return on high yield stocks, with risk held equal. Other tests have explored the ownership of stocks, to see whether high yield stocks are in fact predominantly owned by investors in low or zero tax brackets, and low yield stocks by investors in high tax brackets. A number of criticisms have been directed at these studies. Some have claimed that the results may be heavily affected by the "small firm" effect. Others have said that observed seasonal patterns in stock rates of return may have affected the results. Others have criticized the dividend yield data used in the tests, on the grounds that important information effects have not been properly allowed for. And there have been criticisms of the feasibility of strategies designed to take advantage of yield effects.

Ramaswamy described the steps he had taken to deal with criticisms that had been made of earlier research. First, he discussed the matter of establishing the dividend yield. He used monthly data, from the CRSP tapes. The dividend for the month was the announced dividend, if the announcement had been made before the beginning of the month, and was a forecasted dividend if an announcement had not
been made. The forecast was based upon the past dividend payment and the pattern of dividend payments. He observed that the most efficient forecasting method would treat each stock separately, examining the past dividend and the payment pattern for each stock. This was simply not practical, and what he used was a forecasting model that used the payment behavior of all firms to predict the next payment for each firm.

He first reported the results of pooled time-series, cross-section regressions, for the time period 1940 through 1983, with stocks ranked monthly by dividend yield and then divided into quintiles, by capitalization rather than by number of stocks, from lowest yield to highest yield.

The following equation was fitted to the data for each of the five groups.

\[ R_{it} - r_{ft} = G_0 + G_1 \beta_{int} + G_2 (d_{it} - r_{ft}) \]

where

- \( R_{it} \) = rate of return for group \( i \) in month \( t \)
- \( r_{ft} \) = the risk free rate in month \( t \)
- \( \beta_{int} \) = the beta coefficient for group \( i \) from the past 12 months
- \( d_{it} \) = dividend yield on group \( i \) in month \( t \)

It turned out that the coefficient \( G_2 \) ranged from .42 for group 1 (the low yield stocks) to .029 for group 5 (the high yield stocks). Ramaswamy interpreted this coefficient as the complement of the effective tax penalty imposed on dividend receipts. These results then seemed to validate the argument that high yield stocks are more attractive to investors who pay little or no tax.

Next, Ramaswamy arrayed the average of the \( G_2 \) coefficient for all five groups, by months. There did appear to be some seasonal pattern, but the average coefficient over all twelve months did not differ significantly from the average coefficient over months February through December (excluding January, which may be alleged to produce anomalous results).

These first results had been based upon assumed monthly transactions, and Ramaswamy pointed out that one might argue monthly in and out trading is prohibitively expensive. He moved next to results based upon annual rankings and groupings. These results were not based upon a regression equation, but tabulated mean rates of return and standard deviations of rates of return for the five groups. For the period 1931 through 1984, the mean return for the high yield group was 15.7 percent. The mean return for all groups was 9.4 percent, so the high yield group had a distinctly higher rate of return than the average. At the same time, the standard deviation for the high yield group was higher, at 25.5 percent, than the standard deviation for all of the stocks, at about 21 percent. For three sub-periods, 1931 through 1948, 1949 through 1966, and 1967 through 1984, the mean returns for the high yield group were consistently well above the mean returns for all five groups. The standard deviations for the high yield groups were generally but not always higher than the standard deviations for all five groups.

The behavior of the low yield groups was less consistent. For the 1931-1984 period, the mean annual return was a little above the average for all five groups, but the standard deviation was close to that for the high yield group. For the subperiods, the mean return for the low yield group was generally but not always lower than the mean return for all five groups, and the standard deviation was always higher. Ramaswamy pointed out that the low yield group probably includes, at least in the later years, a number of small stocks and the results for this group may incorporate the "small firm effect".

Ramaswamy next presented a tabulation of alpha and beta measures for the five groups for a variety of time periods. The general conclusion was that the low yield portfolios had high betas and the high yield portfolios had low betas. Ramaswamy next produced calculations of bond betas. He had performed a simple regression of the stock portfolio rates of return on long-term government rates of return, for the low yield and the high yield groups. The most interesting results, however, came from a multiple regression, in which the rates of return on the stock portfolios were regressed on rates of return on the S & P 500 Index and on rates of return for long-term government bonds. What was of interest then, was the beta coefficient with respect to the government bond returns. It seemed quite clear that the low yield portfolios had low bond betas and the high yield portfolios had high bond betas. This was a surprising
result. One might expect that the low yield stock portfolios would have longer durations and therefore high elasticities to returns on long government bonds. The observed effect seemed to be just the opposite. The results may be related to some of the findings reported earlier in the Seminar by Martin Leibowitz, who discovered elasticities of stock returns to long interest rates implied durations that were very different from those obtained from the dividend discount model.
BONDS - REFUNDING

9. REFUNDING CONSIDERATIONS FOR HIGH COUPON DEBT: CALLS, TENDERS AND EFFICIENCY (Spring, 1986)

Andrew J. Kalotay, Vice President, Salomon Brothers, Inc., distributed a set of tables and graphs to illustrate his presentation. His talk covered four points:

1. The terms of refunding provisions, and the prospects for refundings in the near future.

2. An analytical framework and scenario analysis.

3. Option valuation and efficiency.

4. Extensions of the analysis to more complex securities.

Kalotay discussed briefly typical refunding provisions for corporate and utility bonds, and he presented a chart of yields on new long AA utilities, demonstrating clearly that in 1986 one can expect substantial refunding of utility bonds issued at high interest rates in 1981. There may also be some refundings of issues that came out in 1974. Salomon Brothers is predicting for 1986 refundings of $28 billion if the long treasury rate is at around 8 percent, and $15 billion if the long treasury rate is around 10 percent. The firm has identified 1986 as "the year of the call".

Turning to specific issues, Kalotay showed the results of an analysis that has been performed on all of the bonds in the Salomon Brothers indices, mapping through the year 2000 the rate at which refundable issues should be refunded, together with an interest rate scenario identifying the point in time at which each issue probably will or should be refunded.

Turning to his second topic, the analytical framework, Kalotay first discussed briefly the accounting and tax treatment of call premiums. A discounted cash flow analysis is used to calculate the after-tax present value of the interest savings due to a refunding less the cost of the call premium. The present value savings are not difficult to calculate, for any particular refunding rate and any particular year of call. Some complication is introduced if the refunding is to be by way of another refundable bond, so that the issuer can contemplate the possibility of refunding the outstanding issue and then refunding the refunding issue at a later date.

Kalotay's third topic concerned the valuation of the call option on a bond. Referring to some earlier published work, he commented on the importance of tax considerations and of volatility of interest rates in arriving at the option valuation. History suggests a volatility range of 8 percent to 14 percent, and most of Kalotay's examples incorporated a 12 percent estimate. In what he identified as probably his most important exhibit, he showed for a sample bond, for each of a number of refunding rates, first the value of the call option on the outstanding bond, second the present value saving from refunding with a noncallable bond, and third the value of a call option on the refunding issue. In the event of a refunding, the issuing corporation sacrifices the value of the call option on the outstanding issue, and it gains the sum of the present value savings from refunding and the value of the call option on the refunding issue. In the best case, the value given up equals the value received. At higher refunding rates, the value given up exceeds the value received. Kalotay's measure of efficiency of refunding is the ratio of the value gained to the value given up. This cannot be greater than 100 percent, but it can be as low as zero percent, depending upon the refunding rate. In general, the refundings recommended by Salomon Brothers have been achieved at efficiencies of 85 percent or greater.

Kalotay's fourth topic was some extensions of his methodology to more complex securities and transactions. He identified sinking fund management as one of these extensions, and showed how one decided whether to make a sinking fund payment as scheduled, or whether to substitute an early refunding.

Finally, Kalotay discussed public tender offers for high coupon debt that is not refundable. The analysis is very similar to the refunding analysis, but one must deal now with two unknowns, both the refunding rate and the tender price. As in the case of refunding, an efficiency can be calculated now for each pair of tender price and refunding rate.
CHAOS THEORY

10. APPLICATION OF NON-LINEAR
   SCIENCE STATISTICAL INFERENCE
   THEORY TO FINANCE AND
   ECONOMICS  (Spring, 1988)

   William A. Brock, F.P. Ramsey Professor
   of Economics, The University of Wisconsin,
   distributed a paper entitled, Applications of Non-
   Linear Science Statistical Inference Theory to
   Finance and Economics.

   His presentation dealt essentially with a
   number of new statistical tools that are able to
   detect temporal and cross-sectional
   dependence in time series of returns that
   standard statistical methods are unable to detect
   and therefore declare the time series to be
   unforecastable white noise. A specific example is
   testing the departure from the randomness
   predicted by random walk theory of the
   logarithmic first differences of stock prices.
   Standard statistical tests will confirm the random
   walk theory, while the new tests may not. The
   new methods are most useful when an analyst is
   most in doubt on the parametric form of
   alternative hypotheses on the departure of the
   residuals of the null model from randomness. An
   important point that emerged from the
   presentation is that while the newer methods are
   valuable in identifying patterns, that is deviations
   from randomness, we are still a long way from
   knowing what those patterns mean and what
   caused them.

   As an introduction to his statistical
   methods, Brock described what he called the
   "tent map". We consider a variable x that takes
   different values at time intervals, so that at any
   particular point in time the variable can be
   represented as x(t). Now consider the rule that
   x(t) always lies between 0 and 1. When x(t) is
   less than or equal to 1/2, then x(t+1) = 2x(t), and
   when x(t) is greater than or equal to 1/2, then
   x(t+1)=2-2x(t). If the rule just described is
   translated into a graph, the result is a tent,
   consisting of a line rising from left to right with
   a slope of 2, and one rising from right to left with
   a slope of -2. The rules described above
   constitute "deterministic chaos" and have a
   number of interesting properties, which Brock
   discussed. First, if you draw x(t) at random, the
   rules will generate a uniform distribution from 0 to
   1. Second, if a small error is made in the
   measurement of the first x(t), the loss of
   precision in the forecast following the rules
   grows exponentially until the forecasting ability is
   completely destroyed, and all we know is that a
   future x(t) lies between 0 and 1. Third, and
   perhaps most important, is that the result of
   applying the rules is to create what appears to be
   a random series of numbers, even though we
   know that series was generated by two simple
   rules. A perhaps more interesting property is
   that some small changes in our rules can lead to
   dramatic long run changes in the series
   generated, creating turbulence and apparent
   chaos.

   As a first step to looking for structure in a
   time series that at first appears to be random,
   Brock suggested plotting a graph. This will work
   in many cases but beyond two dimensions, we
   need a mathematical approach.

   An important part of the mathematical or
   statistical analysis involves determining the
   dimension. The dimension is a measure of the
   complexity of the pattern to be found, and
   specifically it is the number of non-linear factors
   that generate the data being observed. Brock
   offered the definition that "dimension is a crude
   measure of the level of parsimony (the minimal
   number of parameters) needed in a dynamic
   model to fit the data)."

   Dimension can be estimated graphically,
   and Brock demonstrated the graphical
   procedure using series of stock returns. He said
   that chaos theory teaches us that trajectories
   generated by chaotic maps are potentially
   perfectly predictable provided that you can
   measure the state perfectly. But if you measure
   the state today with error then forecasts of the
   future state become worthless at an exponential
   rate. Hence nonlinear dynamicists sometimes
   say that chaotics dynamics are unpredictable.
   Financial logic leads us to believe that low
   dimensional chaotic deterministic generators for
   stock prices and returns over daily to weekly time
   periods should be extremely unlikely unless
   measurement error in the state is enormous or the
   "economic" time on which the dynamics run
   is faster than chronological time. The theme will
   be that if there is forecastable structure in stock
   returns it must be difficult for traders to discover
   it. Randomness multiplication phenomena that
   arise in chaos theory is an example of potentially
difficult to detect forecastable structure that the
methods of chaos theory are specifically
designed to detect.
If you have been reared on efficient markets theory at the University of Chicago the only kind of forecastable structure present in stock prices will either have to be linked to movements in the price of factor risks and movements in the risk free rate (due to the business cycle perhaps) or, will have to be exotic enough that new scientific methods will be needed to discover it.

Scheinkman and LeBaron have estimated the correlation dimension for 1226 weekly observations on the CRSP value weighted US stock returns index for 1962-1985. They get roughly 6. They calculate another estimate of dimension due to Taken which was also close to 6. Similar results for closing prices over the mid 1970s to the mid 1980s for gold and silver on the London Exchange were reported by Frank and Stengos (1986). They get correlation dimension estimates between 6 and 7 for daily, weekly, and biweekly series.

Brock worked with monthly returns on the value weighted New York Stock Exchange index for the mid 1920s to the late 1970s, with monthly returns on the equally weighted NYSE index for the same period, and with weekly returns on the value weighted CRSP index for 1962-1985, with the time period broken roughly in half to permit two tests. For the CRSP index, the dimension over both time periods was between 6 and 7. A non-random structure was much more evident over the first period than over the second. For the equally weighted NYSE index, evidence of non-randomness was higher than for the value weighted index.

Brock also tested a series of 720 months of returns on Kodak stock, and found little evidence of non-randomness. The conclusions so far seem to be that while these advanced statistical techniques can pick up patterns in index returns over time, they do not pick up the patterns in the returns on individual stocks.

In concluding, he observed that even though stock returns themselves may be hard to predict it may be possible to predict other conditional moments such as conditional variances, conditional skewnesses, and possibly the conditional moment generating function. This has obvious implications for management of risks through put and call options. This theme is related to the work of Bates (1987) who has shown how the differential between out of the money put prices and out of the money call prices can be used to infer information about conditional moments such as skewness in returns on the underlying security. The knowledge that predictability of conditional moments exists in stock returns data has implications for searching for potentially profitable positions like those discussed by Bates.
DERIVATIVE SECURITIES AND CONTINGENT CLAIMS

11. S & P 500 FUTURES AND CASH STOCK PRICE VOLATILITY (Fall, 1987)

Eugene E. Record Jr., Senior Vice President, Thordike, Doran, Paine & Lewis, introduced the topic of volatility in investment markets. The question for this and the next presentation concerned the extent to which financial innovations have affected volatility and efficiency in equity and fixed income markets.

Lawrence Harris, Assistant Professor of Finance and business Economics, The University of Southern California, distributed a paper entitled S & P 500 Futures and Cash Stock Price Volatility.

He began by observing that while stock price volatility has increased in recent years as measured by the standard deviation in price levels, the standard deviation in percentage returns has not increased. His concern, however, was not with a general trend but with the question whether trading in futures and options has affected volatility.

He set out some conflicting predictions that might be arrived at on theoretical grounds showing that the case could be made for either increased or decreased volatility. He then discussed some empirical strategies for sorting out the volatility effects of markets in derivative securities. The difficulty comes from estimating what the volatilities would be in the absence of these derivative markets. His own approach was cross-sectional, attempting to compare the volatility of stocks in the S & P 500 index, which one might expect to be affected by trading in S & P options and futures contracts, with the volatility of similar stocks not included in the index. One might expect that the S & P 500 stocks would be more volatile for a number of reasons. Trading in derivative contracts might be destabilizing by creating more demand for liquidity, and hence increasing short term volatility and negative autocorrelation, as well as by disrupting the fundamental value formulation process and creating more long term volatility. One might also expect that the trading in derivative contracts would cause new information to be impounded into the cash price more rapidly, bringing about greater efficiency but also greater volatility. Finally, one might anticipate that increasing use of index funds will have reduced liquidity in the S & P 500 stocks, thereby increasing volatility.

The methodology adopted by Harris assumed that volatility might be related to stock beta, stock price, firm size, and infrequency of trading as well as to the effect of derivative contracts. He therefore set out to create a sample of stocks that would be comparable to the S & P 500 stocks in terms of these four variables. Having established his comparable sample, he then used regression analysis separately on the set of 500 S & P stocks and the set of non-500 S & P stocks, to isolate the contribution of each factor to volatility. His study covered the period 1978 through 1986, so that approximately half of the observations preceded the introduction of trading in S & P futures and options contracts, and about half followed that introduction. Standard deviations were calculated in the rates of return on individual stocks for each year, over 1, 2, 3, 5, 10 and 20 day intervals. The regression equation used took the following form:

$$\text{STD}_i = b_0 + b_1 \ln S&P_i + b_2 (\text{AbsBeta}_i \times \text{MkSTD}) + b_3 \ln \text{InvPrice}_i + b_4 \log \text{MkVal}_i + b_5 \log \text{NoTradeFreq}_i + \epsilon_i$$

where $\text{STD}_i$ is the return standard deviation of stock $i$, $\ln S&P_i$ is a dummy classification variable which takes the value of 1 if the stock is on the S & P 500 List and 0 otherwise, and $\text{AbsBeta}$, $\text{MkSTD}$, $\ln \text{InvPrice}$, $\log \text{MkVal}$, and $\log \text{NoTradeFreq}$ are the independent variables discussed above.

Harris anticipated that he would find a positive coefficient for the dummy variable for S & P 500 listing, a positive coefficient for the beta, a positive coefficient for the inverse stock price variable, a negative coefficient for the market capitalization, and was not sure what the sign would be on the coefficient for the frequency of days on which the stock was not traded.

The source of data was the CRSP tapes, covering only New York stock exchange firms. The S & P 500 sample therefore constituted more like 400 stocks in each year studied.

Turning to the regression results, Harris observed that the mean daily standard deviations for the S & P 500 stocks had been lower than those for the non-S & P 500 stocks until 1985 and 1986. And for both groups, the standard deviations had risen over the years. The increase was statistically significant, but Harris expressed some doubts that it was
economically significant. Harris also pointed out that a comparison of the volatility over short time intervals with the volatility over long time intervals suggested that serial correlations in S & P 500 stock price changes have decreased relative to those for the non-S & P 500 stocks, and that the serial correlation is positive. The evidence was not entirely unambiguous, however, because the 10 & 20 day standard deviations tended to be smaller than the 5 day standard deviations, implying negative serial correlation.

In concluding, Harris observed that he had found volatility shifts that differed between S & P 500 stocks and non-S & P 500 stocks, that one might attribute to futures and options trading in the S & P 500 Index. He had also found, however, that the explanatory power of the dummy variable for inclusion in the index was very small, compared to the explanatory power of his other variables. So his conclusions were quite sensitive to possible errors in the measurement of those other variables. There were two interpretations to be drawn from his results. One is that trading in futures and options has had a destabilizing effect, and the other is that the effect is to increase efficiency in the cash market through more rapid adjustment to new information and hence higher volatility.

In response to a number of questions from seminar participants, Harris said he had undertaken to assemble a sample of non-S & P 500 stocks by using the industry weightings in the S & P 500 Index, and had reached much the same conclusions that were reported. He explained that he had not used trading volume as an independent variable in his regressions, because he thought it might be highly correlated with the dummy variable, representing inclusion in the S & P 500 Index. He acknowledged that the existence of futures contracts on groups of stocks other than S & P 500 stocks tends to weaken his methodology, but he believed that the S & P 500 contracts so dominated other contracts, that for the years he had studied his results were probably still valid.

12. THE DYNAMICS OF STOCK INDEX AND STOCK INDEX FUTURES PRICES
(Fall, 1987)

Robert Whaley, Associate Professor of Finance at the Fuqua School of Business, Duke University, distributed a paper by himself and Hans R. Stoll, of the Owen Graduate School of Management at Vanderbilt University, entitled

The Dynamics of Stock Index and Stock Index Futures Prices.

Whaley described the purpose of his study as an attempt first to see whether one of stock index futures and the underlying index leads the other, second to see whether futures prices or cash index prices overshoot fundamental values, and third to see how price changes of individual stocks within an index relate to movements in the index itself. Beginning with the theoretical relationship between the price of an index futures contract and the price of the underlying index he derived the following equations:

\[ F_t = S_t e^{(r-d)(T-t)}, \]

where \( F_t \) is the index futures price at time \( t \), \( S_t \) is the index price at time \( t \), \( r - d \) is the continuous net cost of carrying the underlying stocks in the index, that is, the rate of interest cost \( r \) less the rate at which dividend yield accrues to the stock index portfolio holder \( d \). \( T \) is the expiration date of the futures contract, so \( T - t \) is the time remaining in the futures contract life.

\[ R_{Ft} = (r-d) + R_{St}, \]

where \( R_{Ft} = \ln (F_t/F_{t-1}) \) and \( R_{St} = \ln (S_t/S_{t-1}) \). Alternatively, since the futures and the stock index simultaneously cause each other, it is equally sensible to write the instantaneous rates of return in the opposite order, that is,

\[ R_{St} = (r-d) + R_{Ft}, \]

Finally, the efficient markets hypothesis implies that successive returns are uncorrelated, that is

\[ r_k (R_t, R_{t-k}) = 0, \]

where \( r_k \) is the lag \( k \) serial correlation coefficient.

From these equations, Whaley identified a number of implications and reported a series of tests of these implications.

First came the serial correlation tests. Minute-by-minute price series for the S & P 500 stock index and futures prices, from April 21, 1982 through December 31, 1986 were used to compute 5 minute rates of return. Serial correlations for these 5 minute returns were computed for each day for lags of one to twelve 5 minute periods, that is from a 5 minute lag up to a 1 hour lag. Serial correlations for rates of return on the stock index itself appeared fairly strong.
for lags up to 15 minutes. The serial correlation for the period August 27, 1984 through December 31, 1986 was somewhat lower than for the period April 21, 1982 through August 24, 1984. Whaley attributed the decline in serial correlation to a rising volume of trading which has reduced the serial correlation induced by infrequent trading.

For the S & P futures contracts, there appeared to be no significant serial correlation at any lag. The statistically insignificant coefficients were negative for all lags, and of approximately the same magnitude for all lags. Whaley attributed this result to the likelihood that futures transactions will alternate randomly between bid and ask prices, showing up in the form of modest negative serial correlation.

The second series of tests involved cross correlation, between the stock index rates of return and the futures contract rates of return. Whaley found strong positive correlation between the contemporaneous rates of return in the two markets, with the average correlation coefficient at 0.57. And the relationship does not appear to have changed significantly over time. Lagged futures returns showed significant explanatory power for the current stock index return. The relationship was weaker in the second half of the period studied than in the first half. On the other hand, lagged stock index returns showed little or no ability to predict the current futures return.

This last finding suggests that futures prices do not overshoot true economic value. If they did, lagged stock index returns would tend to show negative correlation with the current futures return.

The third set of tests made use of a regression to test for contemporaneous and lagged return effects simultaneously. A regression of stock index returns on lagged index returns, a contemporaneous futures return, and lagged futures returns, produced a quite respectable R squared. Most of the variation in the stock index returns was explained by contemporaneous and lagged futures returns. Lagged index returns contributed very little.

Whaley concluded that the futures market appears to lead the index market by up to 15 minutes, with most of the impact coming in the first 5 minutes. He considered the possibility that this phenomenon is due to a lag in the computation and reporting of the stock index level. To check this explanation he had examined returns for IBM stock, correlating IBM returns with returns on the S & P 500 stock index. He found negative serial correlation in the IBM returns, attributing it to the likelihood of transactions alternating between bid and asked prices. He also found the only significant cross correlation between returns on IBM stock and returns on the index was the contemporaneous correlation. The IBM return series does not appear to lead the stock index.

In summary, Whaley concluded that the interrelationship between the price changes of the S & P 500 stock index and the index futures contracts is as one might have expected. The price changes in the futures and cash markets appear in large part simultaneous. The futures market to some extent leads the cash market and this can be attributed in part to the fact that not all stocks in the index trade continuously. It may also be evidence that new market information disseminates first in the futures market. But there is no evidence that futures markets overreact to new information or that futures price changes lag stock index price changes.

13. VALUATION OF CONTINGENT CLAIMS: DERIVATIVE ASSETS ANALYSIS (Fall, 1986)

H. Gifford Fong, President, Gifford Fong Associates, introduced the subject of valuation of contingent claims and derivative assets. Mark Rubinstein, Professor, University of California at Berkely, distributed a paper entitled Derivative Assets Analysis.

He began by drawing a distinction between absolute valuation and relative valuation. The valuation of contingent claims and derivative assets falls within the scope of relative rather than absolute valuation. He drew a further distinction between the valuation of contingent claims and the valuation of derivative assets. Contingent claim payoffs are not derived from some underlying asset. An example might be a claim whose payoff is determined by an inflation rate. Derivative assets, on the other hand, have payoffs that are always derived from the values of underlying assets. And the process of establishing a value for a derivative asset always involves the question how one might replicate the derivative asset with underlying assets whose values are known or can be established through some reliable procedure.
To illustrate the increasing importance of derivative assets, Rubinstein offered a few statistics for June 30, 1986. On that day the total market value of the volume of trading in NYSE listed stocks was about $6.4 billion. On the same day, the market value of the shares represented in trading in exchange-traded equity and index options was $12.9 billion. Trading in exchange-traded index futures, in terms of the delivery obligation of futures contracts, was $8.1 billion. Comparable figures for treasury bond, treasury bill, and eurodollar futures were $11.5 billion, $4.2 billion, and $22.3 billion, respectively. In addition, probably $30 billion of institutional portfolios was being used to manufacture contingent claims through portfolio insurance strategies.

Returning to the matter of valuation, Ross discussed the complexity of establishing a payoff function for derivative assets in terms of the prices or payoffs of underlying assets. And he offered a table one might use to identify sources of difficulty.

<table>
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<tr>
<th>Characteristic of Payoff Function</th>
<th>Easy Valuation</th>
<th>Difficult Valuation</th>
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</thead>
<tbody>
<tr>
<td>shape</td>
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<td>non-linear</td>
</tr>
<tr>
<td># of underlying assets</td>
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<td>2 or more</td>
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<td>price dependent</td>
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<tr>
<td>intermediate decisions to make?</td>
<td>no (European)</td>
<td>yes (American)</td>
</tr>
<tr>
<td>path dependent</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>underlying assets are derivative</td>
<td>no (simple)</td>
<td>yes (compound)</td>
</tr>
</tbody>
</table>

Rubinstein discussed next the valuation problem when the payoff function is linear. Valuation of a forward contract is an example. It turns out that the payoff function is a rather simple one. The position in the underlying assets corresponding to investment in a forward contract consists of purchasing long the underlying asset and borrowing an amount equal to the forward price. In general terms, whenever the payoff function is linear in the prices of the underlying assets, we can expect to replicate the derivative asset by a buy and hold position in the underlying assets, in some cases supplemented with riskless borrowing or lending. The forward contract involves a terminal payoff only, and Rubinstein went on to deal with intermediate payoffs as well.

He turned next to non-linear payoff functions, and took as an example a call option on a stock. A little analysis indicates that the derivative asset here, the call option, cannot be replicated with a buy and hold position in the underlying assets. A dynamic strategy is called for. The origin of a dynamic solution to the problem may be found in a paper by Kenneth Arrow in 1952. And the well-known Black-Scholes valuation model makes use of dynamic adjustment. Black and Scholes made the assumption that the probability distribution of rates of return on the underlying stock was lognormal, so that it could be described completely by its arithmetic mean and standard deviation. With these assumptions they were able to devise a dynamic strategy using only the underlying stock and cash which would exactly replicate the payoff of the call option. The crucial point was that there was no need for information about investor preferences for bearing risk nor was there a need for any estimate of the mean return of the underlying stock. The Black-Scholes model required only one input beyond those necessary for valuing a derivative asset with a linear payoff. This input was the volatility of the underlying stock.

Rubinstein went on to point out that there are other approaches to the valuation of options on stocks and stock indexes. The binomial approach has become particular attractive among those dealing with options. It can cope with a number of conditions not adequately dealt with in the Black-Scholes model.

In a number of cases, where the payoff function is nonlinear, valuation shortcuts are possible because the payoff function of the asset in question may be the same as or similar to a payoff function of another derivative asset or set of derivative assets, one that has already been analyzed. An example is the payoff
function for a protective put, which turns out to be the same as the payoff function for a fiduciary call.

He next discussed stock index futures, pointing out the significant difference between forward contracts and futures contracts. The forward contract is settled at the delivery date. In the case of the futures contract, on the other hand, settlement takes place each day up to the expiration date. Both the forward contract and the futures contract have linear payoff functions, based upon a single underlying asset. But the futures contract has both intermediate and terminal payoffs. It turns out that the value of the futures contract may be very close to the value of the forward contract, but the payoff functions are different.

Rubinstein's next topic was index options. Although the Black-Scholes model has been remarkably successful, it can produce significant misvaluations. The model assumes that the price of the underlying stock or option follows a continuous path with a constant volatility. The assumptions will be violated then if (1) price experiences large discontinuous jumps, (2) volatility depends upon the price of the stock or index, (3) volatility is affected by interest rate changes, and (4) the volatility is driven by some other factor in the marketplace. One would expect that if mispricing is symmetrical the source is price jumps, and that skewed mispricing would be caused by volatility dependent on the price of the underlying asset.

It turns out that for index options the Black-Scholes model works better than it does for a single stock. Jumps in price seem to be less severe and volatility is more constant. A model for index options must, however, deal with a more complicated dividend structure than is the case for a single stock.

Rubinstein's final topic was portfolio insurance. In general, portfolio insurance attempts to replicate a long-term payout-protected European put option on a stock market index by using exchange-traded index futures and options. As a practical matter, since listed options are not protected against cash dividends, insurers generally manage a position in index futures, buying futures as the market moves up and selling futures as the market moves down. The owner of the portfolio will want as high a minimum target value as possible, but also as high a capture as possible of the upside potential in the portfolio. And of course there must be a tradeoff. A complication arises from uncertainty about volatility. The payoff function is often revised to express the upside capture as a function of the realized market volatility. Furthermore, the sensitivity of the derivative rate of return to realized volatility is not itself constant, but will increase the faster the payoff function changes with the terminal underlying asset price. And in addition, the level of transaction costs will change in the same way. The problems cannot be dealt with in an entirely satisfactory manner, although they can be minimized.

He closed by expressing some disappointment that there has been a slowing of research in analysis of derivative assets and the development of techniques to analyze derivative assets. In particular, corporations do not seem to be making much use of derivative asset analysis, although financial institutions and corporate pension fund sponsors are.

14. VALUATION OF CONTINGENT CLAIMS -- THE PRACTITIONER'S VIEW (Fall, 1986)

This presentation was delivered by Bernard Kroll, Kidder, Peabody & Company, Inc., and Richard Bookstaber, Morgan Stanley & Company, Inc.

Kroll led off on the theme of mispricing of futures contracts. He produced substantial evidence that from time to time S & P 500 futures contracts are seriously mispriced in the marketplace. At the same time, he argued that the very low transaction cost for futures contracts (about 1/8 of the cost of transacting in the underlying stocks) tends to offset losses that might be suffered due to mispricing. His conclusion was that trading in futures contracts is still an attractive alternative to trading in the underlying stocks, despite the mispricing.

Futures contracts are particularly valuable for active asset allocation strategies. They are more useful to sponsors, dealing in reallocation of assets among asset classes, than they are for managers whose task is more focused on security selection.

The second major use of futures contracts is for portfolio insurance. And here the advantage is that futures contracts offer faster and cheaper transactions than can be achieved with the underlying securities.
Focusing more specifically on the mispricing issue, Kroll produced data for September 11 and September 12, 1986 showing how serious mispricing can be. And he raised the question, why, in the light of arbitrage opportunities, the mispricing should have taken place at all. It appears that the arbitrage one would expect to eliminate significant mispricings is simply not taking place. Perhaps the market is not yet mature enough. Kroll suggested another reason: that there are not enough investors prepared to enter the market on the side that would benefit from arbitrage profits.

He discussed some recent research at Kidder, Peabody, exploring correlations between sharp moves in the S & P Index and subsequent futures mispricings. It appears that when the market is up sharply, futures are cheaper on the following day. But the index itself shows some autocorrelation, which tends to offset the futures contract mispricings.

Fixed income futures also show mispricing. These mispricing could be due to a number of peculiarities of bond futures. For the treasury bond future, the “cheapest to deliver” choice open to the seller of the contract creates some uncertainty. One might attempt to value the delivery option held by the seller of the futures contract, and Kroll reported that it appears to be worth about one basis point.

His forecast of the future predicts wider usage of futures contracts, more cash settled contracts, more index based contracts, and probably a variety of new contracts.

Bookstaber continued the presentation. At the Spring 1986 Q Group Seminar (see summary #15) he had spoken on the subject of options embedded in fixed income securities. And in this talk he went on with derivative assets embedded in securities, including calls, attached warrants, yield curve notes, and convertibles. It was Bookstaber’s opinion that derivative securities embedded in other securities are not the most effective way to meet either investor or issuer demand. One cannot simultaneously make independent choices of the underlying security and the embedded derivative security. A bond with an attached warrant, for example, makes the benefit of the warrant available only to an investor who is satisfied with the credit underlying the bond.

Some have predicted that derivative instruments will become more complex in the future. There are some advantages to investment bankers in this increased complexity. The investment banker at the present time has information about complex derivative instruments that is probably not easily available to either issuers or investors. Partly because of this, the investment banker performs an enormously important market making function. And his function is extremely profitable. Bookstaber’s judgment is that some simplification and standardization of instruments is desirable and inevitable, to improve efficiency for both issuers and investors. A number of institutions exist with the necessary networks in place to connect issuers and investors. Trading in simple instruments can be carried out on such networks to the exclusion of the at present highly paid intermediaries.

The investment banker who makes a market today provides an inventory service, and Bookstaber addressed the question whether issuers and investors could get along without this service. He believes that dynamic hedging may take the place of intermediary transactions now found necessary or attractive by issuers and investors.

In summarizing his forecasts, he believed that markets would become more standardized and market makers less important. There will be greater separation of derivative securities from the underlying securities in which they are now embedded. And the role of brokers will involve less formal market making, and more arbitrage and hedging. It is easiest, he said, to standardize equity securities, listed options and futures, and treasury bond instruments. Mortgage backed securities, corporate debt and preferred stock probably could be better standardized. Municipal securities, high yield bonds, private placements and some over-the-counter options probably cannot be standardized.

Following the presentation, a number of questions and comments came from the participants. It was pointed out that some of the option features embedded in securities are there for other than interest rate risk reduction. The call feature in a bond, for example, does offer interest rate protection to the issuer. But it also offers the issuer ability to eliminate the bond issue for reasons other than declining interest rates.

A question was raised with respect to the impact of the use of portfolio insurance on
The volatility of the stock market. It was generally agreed that this usage probably is raising market volatility. But as volatility rises, portfolio insurance will become more expensive and one might expect a point to be reached beyond which investors are unwilling to pay the price of insurance. Insurance usage may then level off, and any increase in volatility may cease. But Rubinstein raised the possibility that at that point market volatility may have been raised significantly from its level before the introduction of insurance.

15. TRADING AND HEDGING BONDS WITH IMBEDDED OPTIONS
(Spring, 1986)

Richard Bookstaber, Vice President, and Joseph A. Langsam, Research Manager, Morgan Stanley & Co., Inc., distributed a paper entitled Exposure Management and Valuation of Bonds with Imbedded Options.

Bookstaber began with an introduction to the kinds of options that are imbedded in bonds. These include equity and interest rate options, and the interest rate options may be held in short or long positions by the investor. For a callable bond, for example, the investor can be thought of as having sold an option to the bond issuer. And for a put bond, the investor can be thought of as having purchased a put option. The focus of the presentation was to be on interest options, including those held both long and short.

It was Bookstaber's observation that the options imbedded in bonds are quite generally mispriced. This is partly because of the complexity in valuing these options and partly because of a general lack of knowledge of options on the part of those who trade bonds. He described the value of a bond with an imbedded option as the value of a bullet bond plus or minus the value of an option, depending upon whether the option is held in a long or short position. This means that the sensitivity of the price of a bond to changes in interest rates must reflect the sensitivity of the value of a bullet bond as well as the sensitivity of the value of an option. One of the interesting consequences is that for a callable bond the payoff is greatest if interest rates do not change, and declines with either an increase or a decrease in interest rates. Furthermore, the closer the bond is to the first call date, the more pronounced this payoff effect. For a put bond, the sensitivity of payoff to changes in interest rates is just the reverse, with the lowest payoff corresponding to an unchanging interest rate, and higher payoffs for either positive or negative changes in rates.

There are three ways to take advantage of the mispricing of a bond with an imbedded option. One is to buy an undervalued bond and hope that the mispricing will be corrected over time. Unfortunately, one cannot be sure that this correction will take place. A second possibility is to create an arbitrage hedge, but this is very difficult for both put bonds and callable bonds. This is because options on bonds are not detachable and one must make a substantial bond investment in order to establish a hedge, and because it may be necessary to keep rolling over the hedge. Finally, one can in effect bet on volatility. The purchaser of a callable bond is betting that rates will be stable, while the purchaser of a put bond is betting that rates will be volatile.

Bookstaber turned next to the subject of duration. The duration of a bullet bond is relatively straightforward, although for all but zero coupon bonds duration changes with interest rates and also as the maturity of the security approaches. But options also have a duration, so the duration of a bond with an imbedded option has two elements in it. The option duration is higher than the duration of the underlying bond, and in some cases may be many times the duration of the bond. Bookstaber showed in graphical form the duration of a callable bond as a function of interest rates, for different time periods of call protection. The duration rises rather sharply with the interest rate, at rates below the coupon, and then slows its increase and levels off at higher rates. The shorter the period to call, the more dramatic the steep rise that is followed by a slow rise and a leveling. For a put bond, the duration declines with interest rates, falling sharply at rates just above the coupon rate and then leveling off. And once again, the shorter the call protection the sharper the decline with rising rates.

Bookstaber turned to discuss mortgage securities, pointing out that a mortgage backed security has similarities to a callable bond, but really consists of a package of mortgages each of which has its own call option in the form of the ability of the mortgagor to prepay his mortgage. Furthermore, the individual option to prepay can be broken down into options that are activated because of a decline in interest rates and options that are activated for reasons that have
nothing to do with interest rates. The price sensitivity to interest rates, that is, the duration, of a GNMA security is therefore complicated to estimate. Bookstaber presented a graph of price sensitivity relative to the price of a current coupon bond. As the price of the current coupon bond drops from 100 the relative volatility of the GNMA rises slowly. As the price of the current coupon bond rises from 100, the price sensitivity of the GNMA falls steeply. The steep drop is caused by the triggering of the prepayment option held by the various mortgagors. As the price of the current coupon bond continues to rise, the relative price volatility of the GNMA may fall close to zero.

Another instrument that presents an interesting picture of interest rate sensitivity is the Single Premium Deferred Annuity (SPDA). The issuer of such an annuity may have an interest in managing assets so as to match interest rate sensitivity, and effectively immunize the annuities. Some interesting problems arise, as Bookstaber demonstrated. A naïve approach might be to select a GNMA of six years duration as the asset to match an SPDA with a six year duration. However, the relationship between the GNMA duration and interest rates is very different from the relation between the SPDA duration and interest rates. So the match will work very poorly as interest rates move either up or down. It turns out that a put bond is a much better instrument to use in immunizing an SPDA. The point is that one must not only match durations, one must match the pattern of movement of duration with interest rates.

Portfolio insurance in general presents the same difficulty shown specifically by the SPDA. It is not enough to match the duration of the insurance with the duration of the uninsured portfolio at a particular point in time or level of interest rates.

Joseph Langsam continued the presentation, with a discussion of the modeling methodology used in establishing hedges for bonds that have imbedded options. Experience with a binomial model showed that its conclusions violated the put call parity theorem. The answer was to use a multinomial model, and this was what the authors had developed.
ECONOMY

16. A CASE OF MISTAKEN IDENTITY
(Spring, 1987)

Peter L. Bernstein delivered his fourth speech to the Q-Group, opening the spring 1987 program. In this address he felt called upon more as an economist than as a portfolio manager to point out serious misconceptions with respect both to some important issues facing our economy today and to appropriate priorities in dealing with them.

The most important misconception is that reducing or eliminating the federal budget deficit is the key to correcting all other economic problems. The apparent justification for this erroneous obsession with the deficit runs more or less like this: The budget deficit drains national savings, forcing the United States to borrow from foreigners. The demand for capital exceeds the supply, so rates of interest rise, while exports and jobs decline. Eliminating the budget deficit is the first step towards prosperity, while the second step is reducing consumption and increasing savings.

Bernstein began by attacking this reasoning on factual grounds. The very large budget deficits in recent years have in fact been accompanied by a decline in real interest rates. And while one might have argued that heavy reliance on foreign borrowing could only drive the value of the dollar higher, in fact most of the rise in the dollar over the last decade or so took place before the very large Reagan deficits. Furthermore, the private savings rate has been higher in the economic recovery that began in 1982 than in other economic recoveries.

The claim that consumer spending is too high is belied by careful analysis. Measured against a logarithmic trend line, consumer spending since 1981 has been below trend. Similarly, criticism of the level of imports can be answered by another trend line analysis. Imports for 1984 through 1986 were right on trend. Exports present a somewhat different picture. In recent years exports have clearly been below a long-run trend. But closer analysis of the export problem shows that exports to industrial nations have not sagged; it is exports to less developed countries and oil producing countries that have declined. The export problem then is associated specifically with the difficulties being experienced in a certain class of foreign countries.

Having reviewed the facts, Bernstein turned to demonstrate that the argument he was attacking is not only factually but theoretically wrong.

His theoretical discussion began with the statistical identity: trade deficit = private investment - private saving + government budget deficit. This equation, Bernstein pointed out, expresses an identity and not a cause and effect. It may be tempting to ascribe cause and effect, and conclude that government deficits plus the excess of spending over savings leads to trade deficits. But one might just as sensibly argue that trade deficits lead to government deficits. If we think in dynamic terms we realize that all four of the items in the relationship are interrelated and are affected by other factors. For example, if the budget deficit is reduced by an increase in taxes, then it is quite likely that private savings will decline as a direct result, and that private spending will also decline with the possible indirect consequence of still further reduction in investment. The final consequence may in fact be a reduction in exports.

In the end, Bernstein observed, the solution to the trade deficit problem is just to export more. And the answer to the question how to export more, he argued, lies more overseas than in the United States. Germany and Japan do not want to import more from the United States, and other countries do not have the money. But to the extent that we can deal with the problem in the United States, the solution has to take the form of greater encouragement to corporate growth, almost the converse of the economic restraint that accompanies higher taxes, lower government spending, and lower private spending.

In response to questioning, Bernstein elaborated on the matter of increasing U.S. exports. He stressed the importance of foreign countries being able to pay for their imports from the U.S. The bursts of export growth since the second World War have been largely given away in the form of foreign aid, or have been financed by substantial loans. We need to help make it possible for foreigners to buy from the United States. Curbing imports may be a dangerous step to take.

So far as international trade policy is concerned, the serious threat comes from the determination on the part of some countries to
establish and maintain substantial trade surpluses. The attitudes of Germany and Japan pose a real threat to the world economy. There cannot be prosperity in a world in which the major industrial nations are all determined to establish significant trade surpluses.
INTEREST RATES - YIELD CURVE AND TERM STRUCTURE

17. ARBITRAGE-BASED ESTIMATION
OF THE TERM STRUCTURE OF
INTEREST RATES (Spring, 1989)

Robert R. Bliss Jr., doctoral candidate in
finance at the University of Chicago Graduate
School of Business, and Ehud I. Ronn,
Associate Professor of Finance at the Graduate
School of Business, University of Texas at
Austin, presented a paper entitled Arbitrage-
Based Estimation of Non-Stationary Shifts in the
Term Structure of Interest Rates. The work was
funded by the Q Group.

The presentation was given by Ehud
Ronn, who began with a brief review of modern
theories of the term structure of interest rates.
The starting point for the work reported here was
a 1986 paper by Ho and Lee, who took the
observed term structure of interest rates as
given and derived the feasible, arbitrage-free
subsequent movements in the term structure of
interest rates. Disadvantages in their approach,
that Bliss and Ronn sought to overcome, were
threelfold. Ho and Lee used a constant
parameter process, imposing stationarity
through time. Their work led to counter-intuitive
results at extremes, involving infinite interest
rates. Their binominal model was simply not
supported by empirical data.

Before discussing their model, Ronn
described the data used for the project. The first
category was a time-series of pure discount
prices, which were in fact the pure discount
bond prices from the work of Fama and Bliss.
The monthly series covered the period
February, 1962 through December, 1987. A
second category of data included five state
variables: the three month Treasury bill rate, the
long term premium (the excess of the 30 year
government yield over the three month bill
yield), the risk premium (the yield on BBB
corporate debt less the yield on AAA debt), the
current dividend yield on the CRSP value
weighted market portfolio, and a measure of the
"hump" in the term structure.

Ho and Lee had made use of fixed
perturbation functions, for an up state and a
down state. The following indicates how
the discount function at time t after i up state
movements and t minus i down state
movements, at maturity m + 1, moves either to
the up state or down state in the next period:

\[ p^{i+1}(m) = \frac{p^t(m+1)}{p^t(1)} h(m) \text{ upstate} \]

\[ p^t(m+1) \]

\[ p^{i+1}(m) = \frac{p^t(m+1)}{p^t(1)} h^*(m) \text{ downstate} \]

where \( h(m) = \frac{1}{\pi + (1-\pi)\delta^m} \geq 1 \)

and \( h^*(m) = \frac{\delta^m}{\pi + (1-\pi)\delta^m} \leq 1 \)

for \( m = 0, 1, 2, \ldots \), and \( p \) (the "binomial
probability") and \( \delta \) (a volatility parameter) are
intertemporal constants.

In the Ronn and Bliss model, the
magnitude of the perturbations is no longer
fixed, but depends on the vector of observed
state variables. This permits the perturbations to
change, and in particular allows for mean
reversion. Ronn displayed a graph of actual
perturbations, calculated as the ratio of the spot
price to the forward price implied one period
earlier. In other words it was the ratio of the
actual price in a particular period to the price one
would have expected to obtain in that period
using information available one period earlier.
The perturbation then is a sort of "surprise".
Ronn continued, to point out that the data
suggested a trinominal model, with an up state, a
down state, and a "no change state".

The first version of the model was
unconstrained, that is, it was not subject to a no-
arbitrage constraint. Regressions of the up, no
change, and down perturbations on the state
variables produced some interesting results.
Ronn pointed out that the explanatory power of
the model was quite substantial (the R squares
were high). The term premium was the only state
variable significantly impacting the up
perturbations. The short term interest rate, the
term premium, and dividend yield, significantly
influenced the no change perturbations; and the
term premium, hump and dividend yield affected
the down perturbation function. Almost all of the
coefficients were monotonic (increasing or
decreasing) with respect to the maturity.

Testing of the complete model, with the
no-arbitrage constraint, has not yet been
completed. Ronn gave some indications of how the work will proceed and referred to some future applications. These would include:

- Valuation of traded interest-rate sensitive instruments:
  - options on intermediate- and long-term government bonds
  - options on interest rate futures contracts (e.g., T-Bonds and T-Notes futures)
- Valuation of call option implicit in long-term callable bonds.
INTERNATIONAL DIVERSIFICATION AND FOREIGN EXCHANGE

18. ARE JAPANESE STOCK MARKETS TOO HIGH? (Spring, 1990)

Kenneth R. French of the University of Chicago and NBER distributed a paper by himself and James M. Poterba of the Massachusetts Institute of Technology and NBER entitled Are Japanese Stock Prices Too High?

He began by observing that the very high price earnings ratios in Japan have emerged only in recent years. In the early 1970s, Japanese P/E ratios were below P/E ratios in the United States. The surge really began in 1986, when Japanese ratios doubled, and continued through 1987 and 1988. A particularly puzzling aspect of stock prices in Japan is why P/E ratios doubled between 1985 and 1986.

The conventional view says that the Japanese stock market (at least before the decline in 1990) is about 50% larger than the U.S. stock market. However, French and Poterba had adjusted stockholding data for Japan and the United States to account for cross holdings within the corporate sector, and after the adjustments it appears that the U.S. stock market even at the end of 1988 was still larger than the Japanese market.

Seeking an explanation for the high prices of Japanese stocks, French and Poterba had explored the question of leverage and the general belief that debt/equity ratios are higher in Japan than in the United States. It is true that this condition existed until about 1982, when debt/equity ratios began to decline in Japan while they remained fairly steady in the United States. By 1985 the Japanese ratios had dropped to the U.S. level, and in subsequent years they have dropped below the U.S. level. So the explanation for relatively high stock prices in Japan does not lie in high debt/equity ratios.

Another theory has to do with increased foreign ownership of Japanese stocks. French reported that from about 1979 through 1984 there had indeed been a steep rise in foreign ownership in Japanese stocks. But foreign ownership has declined in every year since 1984, while foreign ownership of U.S. securities has risen.

It appears that the high stock prices in Japan are related to high land prices. Land makes up 55% of corporate assets in Japan versus only 12% in the United States. And land prices have risen steeply in Japan. But explaining the rise in land prices is just as difficult as explaining the rise in stock prices. Price/rental ratios are much higher in Japan than they are in the United States. Tokyo land prices are approximately 150 times New York land prices, although Tokyo rents are only 4 times New York rents. French expressed the suspicion that the same factors that are driving land prices up in Japan are driving stock prices up. Furthermore, while there are many explanations for high land prices in Japan, there appears to be no explanation for the steep rise in the last 3 or 4 years.

French and Poterba had found that accounting differences between Japan and the United States explain a large part of the apparently high price/earnings ratios in Japan. First, in Japan unconsolidated earnings, that is earnings of parent companies alone, are more commonly reported than consolidated earnings. This leads then to a comparison between the stock price for the parent, which includes the value of all subsidiaries, with the earnings of the parent, which include dividends from subsidiaries but not their earnings. A second important factor involves reserves. Japanese companies are permitted a variety of deductions for reserves that U.S. companies do not take. The effect here is quite small, however. Third, Japanese depreciation differs significantly from depreciation in the United States, but the impact on price/earnings ratios depends very much upon the state of growth in the two economies. When the accounting adjustments are made, Japanese price/earnings ratios do indeed move down towards U.S. ratios. However, the phenomenon of the doubling from 1985-1986 remains unexplained. And the discrepancy between the two countries is still quite large, with Japanese ratios 2-3 times the U.S. ratios at the end of 1988.

Two further elements remained to be explored. It is possible that investors in Japanese stocks in recent years have anticipated much greater growth than have investors in U.S. stocks. And it is possible that investors in Japanese stocks had much lower required rates of return than investors in U.S. stocks. (French and Poterba believe that
Japanese analysts explain the difference largely on the basis of lower expected returns in Japan.)
French presented the results of calculations of the implied expected growth rate for Japan necessary to bring Japanese prices into equilibrium with U.S. prices. Explaining the doubling of price/earnings ratios in Japan from 1985 to 1986 would require truly extraordinary changes in growth expectations. Similarly, changes in expected rates of return would have to have been extraordinary. An examination of the movement of interest rates suggests that expected rates of return on stocks are not likely to have shifted enough to explain the jump in price/earnings ratios. But French added the comment that the decline in Japanese stock prices in 1990 may suggest that there was a decline in expected rates of return that has reversed.

In summary, French said that the accounting adjustments they made will bring the Japanese price/earnings ratio down to about 32, still well above U.S. price/ratios. And the accounting adjustment cannot explain the doubling of Japanese ratios from 1985 to 1986. He does not believe an explanation for the disparity can be found in growth expectations. While there is some reason to believe expected returns declined from 1985 to 1986, the probable decline is not large enough to explain the increase in price/earnings ratios in that year. In answer to a question as to whether risk premiums might have declined in 1986, French said that this might be the explanation but he has no way of determining directly the risk premium change.

19. THE GDP CASE FOR PORTFOLIO WEIGHTINGS
(Spring, 1989)

David A. Umstead, Managing Director of Boston International Advisors Inc., distributed a brief paper entitled A New Look at International Indexing.

He began with the observation that his presentation was not so much an argument in favor of portfolio weightings based upon gross domestic product (rather than capitalization) as an argument for questioning the rather common use of capitalization weightings and thinking about other kinds of weightings.

There are some attractive features to the use of capitalization weightings in a portfolio. Perhaps the most obvious is that the "market portfolio", consisting of all investable assets, is itself a capitalization weighted portfolio. Furthermore, it is a portfolio that as a practical matter an investor can buy. So it provides a valuable reference point. However, an examination of the capitalization weights for the eighteen countries in the MSCI-EAFE index shows an extraordinarily high weight, at 65%, for Japan and a rather dramatic change in that weight from around 15% in 1969 with a corresponding shrinking in the weights of the remaining countries. Weightings based upon GDP, on the other hand, put Japan at about 34% of the index and show much greater stability over time (Japan was at about 20% in 1969).

Capitalization weights are based, of course, on the relative sizes of stock markets in different countries, rather than the relative sizes of total equity investment. Germany is given a rather low capitalization weighting, because so much of the equity in German industry is held privately. So the size of the stock market may not be an appropriate measure of the relative importance of equity investment in a country. More important, Umstead suggested that since the markets in different countries show quite different characteristics, equity diversification among countries takes on the aspect of asset allocation, somewhat like allocation of a portfolio between stocks and bonds, or between domestic and foreign equity. If international equity diversification is viewed as an asset allocation process, then capitalization weights may not be very important.

In closing, Umstead pointed out that a third kind of weighting -- equal weighting among countries -- has some appeal. It also turns out that historically long-run rates of return for capitalization weighting, GDP weighting, and equal weighting, have been very similar.

20. THE LIQUIDITY FACTOR IN COUNTRY WEIGHTINGS
(Spring, 1989)

Theodore S. Roman, Vice President Goldman Sachs & Co., began by pointing out significant differences among the stock markets of different countries. For example, on October 19, 1987 the Japanese stock market declined only 24%, while the U.S. market declined 34% and the French market declined 40%. Denmark has led the recovery from that event, showing a 40% rise to April 14 1989. Japan was third best at 17%, and only the Japanese market has recently exceeded its pre-crash high. In
Roman's opinion, country weightings may be the key to future performance.

Japan is clearly a very important country in terms of diversification. All of the major international equity indices use capitalization weights and all put Japan at about 65% of the market outside the U.S. Japan accounts for about 44% of a world capitalization weighted index.

In comparing three well-known indices -- the FT Actuaries World Index, the MSCI Indices, and the Salomon Russell Primary Global Markets Indices, Roman introduced the contrast between breadth and liquidity. The first of the three indices emphasizes breadth, with a long list of securities. The third emphasizes liquidity. All three suppliers of indices are adding to their coverage, and are beginning to look alike. But this increase in breadth of coverage also reflects a decrease in liquidity. It is becoming harder and harder to buy the securities necessary to duplicate the broader indices.

Weighting on the basis of gross domestic product (GDP) has some appeal. There is a philosophical difference between capitalization weighting and GDP weighting. One must decide whether it is the capital market that is the key to diversification or the sum of all equity investment within a country. Roman suggested a third method of weighting, one based upon the holdings of all active managers. Matching the overall weighted index would then mean matching the aggregate decisions of all active managers. And deviations would represent a deviation from a standard set by active managers.

Returning to the issue of liquidity, Roman pointed out the dramatic difference between the United States and most other countries in terms of the availability of statistical information on stocks and the ability to buy and sell stocks quickly and in quantity. A relatively small proportion of the foreign stocks included in the most popular indices can compare in liquidity with institutional stocks in the U.S. He expects to see greater use of baskets of foreign stocks offering high liquidity and reasonably close tracking of the standard indices.

21. GLOBAL FACTORS: FACT OR FICTION? (Spring, 1989)

Andrew Rudd, President of BARRA, distributed a paper by himself, Richard Grinold and Dan Stefek, of BARRA, entitled Global Factors: Fact or Fiction?

He described the origin of the work he was presenting in his skepticism, some six or seven years ago, at the widely accepted proposition that all one had to do in international investing was to get the countries right. He questioned whether country factors are indeed more prominent than industry factors. Is it possible that industry factors are even more important, and that West German banks are a satisfactory substitute for Japanese banks in a portfolio? And within a country there may be more than just industry factors. Another question is whether there is a "small cap" effect in all countries.

Seeking answers to these questions led to a factor analysis of stock returns. Understanding the source of the return on a stock in terms of the factors that contributed to that return can lead to a much better understanding of diversification. This is particularly important if a large global portfolio is divided by geographic region, with country sub-portfolios run by different managers. It is also important in terms of how research should be done, whether by industry or by country or by industry within a single country.

The model took the following form:

$$r(n,t) = \sum_{j} (n,j,t) f(j,t) + u(n,t)$$

where $r(n,t)$ is the excess return on asset $n$ in month $t$, $x_{n}(j,t)$ is the exposure of asset $n$ to the $j$th factor in month $t$, $f(j,t)$ is the return on the $j$th factor in month $t$, and $u(n,t)$ is the specific return of asset $n$ in month $t$.

The factors are 24 country factors, 36 industry factors, and 4 risk indices: capitalization size, yield, record of previous success, and price volatility. An individual stock will have an exposure to one country, to one industry, and to each of the four risk indices. The data used were monthly returns over the six years 1983 through 1988. Rudd was able to report that this model showed significantly more explanatory power (in terms of R-squared) than single factor models based on country or industry.

Rudd turned next to discuss the relative importance of local market factors, industries,
and risk indices in explaining stock returns. The first test was a correlation between local market factors and local market indices. A local market index simply records the performance of the aggregate of stocks in that market. A local market factor is something different. The local market factor returns are the returns to a portfolio that has unit exposure to the local country and zero exposure to all risk indices and industry factors, and therefore measures the return attributable to the country net of any global industry or common factor effects. A high correlation between the return on the local market factor and the return on the local market index indicates a highly segregated market, one in which the country factor is particularly important. In presenting a table of correlations, Rudd pointed out that Mexico shows a high correlation and therefore a high degree of segregation, while the United States shows the lowest correlation and therefore the lowest degree of segregation from the rest of the world. It turns out that there are quite significant differences among countries in the extent to which their markets are segregated and therefore unique.

A somewhat similar test recorded the percentage of the 72 months in which the country factor was significant in contributing to the return of a particular stock. A comparison of results for the first 3 and the last 3 years of the 1983-1988 period suggested that the country effect is becoming more important over time, and that the world investment market is therefore becoming less rather than more globalized.

A similar test for industry, rather than country, factors showed considerable variation in the extent to which an industry appears to be truly global rather than unique to a single country. Banks, for example, and international oils, appear to be global. Consumer goods and business services are less affected by a global industry factor. A comparison of the three year periods suggests a strengthening of global influences.

It turns out that the risk indices are much less important than the country and industry factors. Over time it did appear that large companies underperformed small companies; high stock variability companies underperformed by a small margin; high success companies outperformed by a small margin; and high yield companies outperformed low yield companies.

Discussing an analysis of EEC countries rather than the group of 24, Rudd reported that the industry factors had a stronger effect during the three years 1983 through 1985, while the country factor had greater effect in the years 1986-88. These results suggest, contrary to what intuition might tell us, that segregation has been increasing within the EEC.

In concluding, Rudd pointed out that both country and industry effects are important, and that these vary considerably from country to country and from industry to industry, and one must be aware of these differences in setting out to achieve international diversification.

22. INTERNATIONAL COMPARISONS AND RISK MEASURES -- BACK TO BASICS (Spring, 1989)

Gordon M. Bagot, Director of Research and Consultancy, the WM Company, dealt with two topics. The first was an examination of the comparative equity returns of internationally diversified pension funds. The second dealt with reporting of risk and return measures to pension plan sponsors and how that information can be used.

Over the eight years from 1981 through 1988, the MSCI-EAFE index generally outperformed the S & P 500 Index, particularly in the last four years of the period. Over the same period, the performances of pension funds (U.S. and U.K.) generally fell between the performances of the two indices.


An asset mix matrix for pension funds in the U.K., the U.S., the Netherlands, and Japan across equities, bonds, property and other assets, showed great variation from country to country in terms of how pension funds invest their assets. The U.K., for example, shows
heavy investment in equities (which turns out to be a heavy reliance on real assets). Pension funds in the Netherlands emphasize bonds, but most of these are private unquoted loans. Similarly, among the pension funds of the four countries there are substantial differences in the international diversification of equity investments. Pension funds in the Netherlands are invested only 39% in Netherlands equities, while pension funds in the U.S. are invested 95% in U.S. equities.

Turning to some standard reports to pension plan sponsors showing returns and risk measures, Bagot commented that these are probably not very helpful. For one thing, they do not permit comparisons of risk measures over time. He presented a report contrasting the components of risk for the MSCI-EAFE index and the composite of pension funds, broken into standard deviation, market risk, and specific risk, as of September 30, 1987 and December 30, 1988. The shifts in risk were interesting, particularly the doubling of specific risk for pension funds. In a series of graphs he showed over a four year period the relationship between risk and return, demonstrating how pension funds maintained an average beta below 1 and failed to take full advantage of a bull market. He then traced the risk and return characteristics of two fund managers, showing the relative contributions to both return and variability of each manager. While the analysis demonstrated the clear superiority of one manager over the other, Bagot’s impression was that the sponsor was perfectly satisfied with the performance of the latter because the report furnished to that sponsor had not clearly identified the return and risk aspects of the manager’s performance.

23. CURRENCY HEDGED VERSUS UNHEDGED INTERNATIONAL DIVERSIFICATION: A GLOBAL PERSPECTIVE (Spring, 1989)

Vilas Gadkari, Director-Research, Salomon Brothers, began by tracing a little history of currency hedging in international portfolio diversification. Not many years ago taking a foreign currency risk was considered part of investing in foreign stocks or bonds. Then came currency hedging in connection with portfolios of foreign bonds. Cross-hedging came next, to enable the manager to take a currency position in one country and a bond position in another. Even then, it was not generally the practice to examine how the hedging affected the risk structure of a portfolio.

Today, since the U.S. dollar has begun to strengthen, there is a great deal more interest in the hedging question.

Gadkari showed by way of risk and return graphs, the consequences of hedged and unhedged equity and bond positions in Japan, the U.K., and Germany. In some cases the hedged position achieved a greater return than the unhedged, and in some cases the reverse was true. In the long run, for international bond portfolios, we might anticipate no difference between the return on a hedged and the return on an unhedged portfolio. In terms of the composition of risk, it turns out that for foreign equities, about 60% of the risk lies in the foreign equity market itself and at about 40% lies in the foreign currency. For bonds, on the other hand, something like 80% of the risk lies in the foreign currency.

Turning to graphs of 36 months moving volatilities, Gadkari showed that unhedged non-dollar bonds show a volatility close to that of U.S. governments, while hedged non-dollar bonds show a much lower volatility. He attributed the lower volatility of the hedged foreign bonds to the benefits of diversification across several countries, with the possibility that foreign monetary authorities have been better able to control inflation and reduce interest rate volatility than has the Federal Reserve. For foreign equities, the volatilities of the U.S. equity market, unhedged non-dollar equities and hedged non-dollar equities were not far apart, but the hedged non-dollar equities still showed slightly less volatility.

Turning next to correlations, he showed that hedged non-dollar bonds show a little higher correlation with U.S. Treasuries than do unhedged non-dollar bonds. For diversification purposes, the hedged non-dollar bonds have the advantage of a relatively low volatility, but the unhedged non-dollar bonds have the advantage of a relatively low correlation with U.S. Treasuries. It turns out that the correlation of unhedged non-dollar equities with the U.S. equity market is very close to the correlation of hedged non-dollar equities.

Gadkari next showed the results of applying an optimization model to choose among U.S. stocks and bonds, hedged foreign stocks and bonds, and unhedged foreign stocks and bonds. It turns out that optimized portfolios generally consist of U.S. and hedged foreign assets, and do not include unhedged foreign
assets. It further turns out that in order to bring unhedged foreign assets into optimized portfolios it is necessary to lower the expected returns on hedged foreign assets, or lower the correlation between U.S. securities and unhedged foreign securities, or lower the volatility of unhedged foreign securities to an extent that seems unrealistic. In other words, the hedged foreign securities appear far superior to the unhedged foreign securities in achieving an optimized portfolio.

The analysis presented to this point had taken the position of a U.S. investor. Gadkari now took the position of a U.K. investor, and then a Japanese investor, repeating the consideration of correlations and the optimizations. For the U.K. investor, the optimized portfolio relied primarily on hedged non-U.K. securities, but at the minimum variance extreme some unhedged foreign securities were included. For the Japanese investor, hedged non-Japanese securities were the primary source of diversification, but some unhedged non-Japanese securities were included in optimal portfolios. It turns out that for bonds significant changes take place in the correlation matrix as we change the base currency. For equities, on the other hand, there do not appear to be significant changes. The end result is that non-U.S. investors may have good reason to take currency exposure, while U.S. investors should prefer a hedged position.

24. EQUILIBRIUM EXCHANGE RATE HEDGING (Spring, 1989)

Fischer Black, Partner, Goldman, Sachs & Co., distributed two papers, one entitled *Equilibrium Exchange Rate Hedging*, and one entitled *Universal Hedging: How to Optimize Currency Risk and Reward in International Equity Portfolios*.

In the papers Black presents and discusses the somewhat surprising conclusion that in a world where everyone can hedge against changes in the value of real exchange rates, and where no barriers limit international investment, all investors should hedge currency risk, all investors should hedge less than 100% of their foreign investments, and the fraction of foreign investments that should be hedged is the same for all investors of whatever nationality. The fraction that should be hedged is given by:

\[
\frac{u_m - \mu_m^2}{\mu_m - 1/2\sigma_e^2}
\]

where \( u_m \) is the average across all investors of the expected return on the world market portfolio, above the riskless rate, \( \sigma_m^2 \) is the average across all investors of the variance of the world market portfolio, and \( \sigma_e^2 \) is the average exchange rate variance across all pairs of countries.

In his presentation, Black stressed the assumptions lying behind his conclusion. It is assumed that the investor in each country consumes a single good but invests in a diversified portfolio of domestic and foreign goods. Each country is defined by the good that its residents consume. Each investor maximizes expected utility, defined in terms of that investor's own good. This translates into maximizing expected arithmetic return for a given risk, or minimizing risk for a given arithmetic return. Exchange rate contracts are expressed in real terms; borrowing and lending are in real terms; and there are no taxes, currency controls, transactions costs or barriers to trade.

He also pointed out that his model does not assume a number of things. It does not assume that exchange rate changes will have to reverse. It does not assume that the expectation is that exchange rate changes will be zero in the long run. It does not assume that exchange rate bets constitute a zero sum gain. It does not assume any particular correlation between exchange rate changes or between exchange rate changes and stock returns of return.

It turns out that all investors should hold the same portfolio of goods (or stocks), the world market portfolio, mixed with borrowing and lending in different currencies. All investors should hedge their foreign investments by the same percentage, and as the formula above indicates, this percentage depends on three averages. The averages are weighted, and the weights depend upon the percent of world wealth held in a country and the percent of world equity held in that country.

It is interesting that the appropriate percentage of foreign investments to be hedged is independent of expected changes in exchange rates, of correlations between any two exchange rates, and of correlations between an exchange rate and the rate of return on a stock. It turns out that the effects of the expected changes in exchange rates and the covariances of exchange rates exactly cancel. If exchange
rate risks are such that a hedge reduces portfolio risk for investors in A, but not for investors in B, then investors in A will be willing to pay investors in B to take on a hedge. The mean exchange rate change will adjust until both sides are satisfied putting on the hedge. Investors in A will have hedged to achieve risk reduction, even at the cost of reduced expected return. Investors in B will have hedged because the hedge increases their expected return even though it also increases their risk.

25. HEDGED AND UNHEDGED INTERNATIONAL PORTFOLIO STRATEGIES (Spring, 1989)

Gary L. Bergstrom, President of Acadian Financial Research, began with a review of the empirical evidence on hedging strategies. An examination of four time periods -- 1976-1978, 1979-1981, 1982-1984, and 1985-1987, indicated that while hedged foreign equity portfolios always produced lower volatility than unhedged portfolios, they sometimes produced lower and sometimes higher rates of return. Bergstrom pointed out the difficulty we have drawing any clear conclusions from the empirical evidence. We do not have reliable data from years before 1975 and the few years since 1975 simply do not give us much upon which to base expectations.

His second topic had to do with the practicalities of implementing currency hedging. The issues an investor must deal with include transaction costs, the appropriate "baskets" of currencies to work with, and various administrative and legal concerns.

Bergstrom's third topic was the predictability of foreign exchange rate changes. Predictability depends upon inefficiency in the foreign exchange markets, and Bergstrom had constructed a simple momentum model to test for inefficiency. From the spot rate of exchange between the U.S. dollar and the Deutsche Mark, and the forward rates, one could calculate the expected spot rates. The difference between the expected and the actual spot rates provided a series of "unexpected" monthly returns. Non-parametric runs tests rejected the randomness hypothesis at a 95% confidence level. This suggested that the foreign exchange market is not as efficient as some have claimed.


Edwin J. Elton and Martin J. Gruber, Nomura Professors of Finance at the Stern School of Business Administration at New York University presented a paper entitled A Multi-Index Risk Model of the Japanese Stock Market.

Elton began the presentation, describing the research as involving the development of a model to examine returns on stocks on the Tokyo Stock Exchange, separating out common elements from those unique to each stock.

Growing out of the work of Markowitz, and his quantification of risk and an efficient frontier, had come the classification of security returns between systematic and unique returns. The single index model attributes systematic return to one index or factor. But a multi-factor model may be more appropriate if returns across securities are due to more than one common factor. The research Elton described was directed to determining whether a single or a multi-factor model would work best for Japanese stocks. Factor analysis extracted factors from stock returns, and the model was then tested to see whether it performed better than a single factor model and whether it was stable enough to be used in forecasting. Elton commented on the differences between this model and the APT model, which is also a multi-factor model.

A sample of 393 stocks was divided randomly into four samples. Each of the four samples was subjected to maximum likelihood factor analysis. The chief reason for using four samples was to see whether each of the four yielded the same factors. The 393 stocks were those usable from the NRI 400 Stock Index, one of the most widely used indexes in Japan and constituting 70.9% of the total capitalization of the first section of the Tokyo Stock Exchange. A total of 180 months of price and dividend data were available: from April 1971 through March, 1986. Using canonical correlation, the researchers concluded that the stock returns were explained by four factors and the four samples yielded up the same four factors.

Gruber took over the presentation, to discuss how well security returns were explained by a four factor model compared to a single index model. The explanatory power of the single index model proved to be much less than that of
the four factor model. In addition, when the set of stocks was divided into 20 portfolios ranked by size, the explanatory power of the single index dropped substantially from the group of largest stocks to the group of smallest stocks, while the first of the four factors showed much more uniform explanatory power from large stocks to small. The first factor appeared to resemble an equally weighted, as opposed to a capitalization weighted, market index. It turns out that for Japanese stocks, unlike U.S. stocks, small firms show much lower betas (lower market risk), than large firms. And in Japan, small firms produce higher returns. One interpretation of these results is that beta, based on a stock index, is not a satisfactory measure of risk for Japanese stocks.

Gruber reported one more test of stability. Portfolios were selected to match the Nikkei 225 Index. The sensitivity of that index was measured against the Tokyo Stock Exchange Index (for the single index model) and against the four indexes of the four factor model. Once the sensitivities were determined, the researchers calculated the composition of the portfolios intended to match the index. It turned out that the matching portfolios formed using four factors tracked the index much better than the portfolios formed on the basis of the single index model. The conclusion was that the four factor model provides a much better explanation of the stock returns than does the single index model.

Gruber reported limited research attempting to establish a relationship between each of the four factors and some fundamental economic variables. This research needs to be carried further; the economic variables used could be classified as measures of inflation, interest rates, foreign trade, petroleum prices, economic conditions, and U.S. interest rates and inflation. However, no conclusive relationships were established.

In concluding Gruber observed that there are a number of applications for the four index model. The model can be used to design a portfolio to match a benchmark, for example to construct an index fund modeled after the Nikkei 225 Index. The model could also be used to establish a completeness fund.

27. CLOSED END COUNTRY FUNDS: PROS AND CONS (Spring, 1989)

Steven Cress, Senior Closed-End Analyst, Prudential Bache, distributed a Prudential Bache industry review of closed-end funds. He began with a brief discussion of international equity diversification, and pointed out some of the elements that make investment in foreign countries particularly attractive. He went on to deal with the advantage of using a closed-end country fund to participate in the equity market of a foreign country, and then discussed features of closed-end country funds one might want to consider in making a selection.

There seems to be no clear explanation for the magnitude of the premium or discount to net asset value at which a closed-end fund is quoted. It does appear that a high dividend yield tends to increase the premium or lower the discount. And it also appears that the more frequently dividends are distributed (some are distributed monthly), the higher the premium or the lower the discount. Cress mentioned a number of other factors, including broker support, size of management fee, and management performance, that are likely to have some effect on the relation between the net asset value and the price at which the fund is quoted.

The publication that was distributed included a number of statistical tables on closed-end funds.

Laura E. Luckyn-Malone, Portfolio Manager, The Japan Fund and the Scudder New Asia Fund, Scudder, Stevens & Clark, began her presentation with a brief history of closed-end country funds. The Japan Fund was the first of these, established in 1962 as a closed-end fund and converted a couple of years ago to an open-end fund. It has achieved for its initial investors an average rate of return of 20% per year, and an original $10,000 investment with all distributions reinvested, would be worth over $1 million today. Scudder introduced the Korea Fund in 1984, a fund that has never sold at a discount and is currently selling at a premium of over 80%. The more recent New Asia Fund has been less successful in the marketplace, and is currently selling at a discount.

She reviewed the basis upon which Scudder decides to offer a new closed-end country fund. First, there has to be a conviction
that the fund will give investors special access to a country, access they could not achieve on their own. In 1982, when the Japanese stock market was relatively inaccessible to Americans, this was what the Japan Fund achieved. The Korea Fund enjoys a special license to invest in Korea, something that is not available to investors generally. The New Asia Fund has no special license, but does access over-the-counter stocks in Japan, and common stocks in Indonesia and the Philippines that are not easily accessible to individuals or even to small institutions. The research required must be manageable. Scudder has turned down proposals for country funds on the grounds that it is simply not feasible to do the necessary research. Management independence is another important element. She said that managers of some closed-end country funds are vulnerable to conflicts of interest because of the relationships they have within the country where the fund is invested. A further element has to do with the value to investors of the convenience offered by the closed-end funds in dealing with custodiahips, withholding taxes, and conversion of foreign currency. Finally, it must be possible to offer and manage the fund at a reasonable fee. She commented that the SEC has found the discount at which a closed-end fund sells is related to the fees charged.

Lucky-Malone reviewed the performance of the Japan Fund and her assessment of the economic outlook for Japan. She believes that Japan offers attractive investment opportunities, despite the apparently high level of Japanese stock prices. The fund's portfolio is positioned to take advantage of deregulation within Japan, corporate restructuring, and increased spending on the infrastructure.

She went on to describe the Far Eastern region as an economic entity. Japan stands out as the mature member of the group, supplying capital and providing markets. Examples of newly industrialized entities are Hong Kong, Singapore and Taiwan. Still in the developing stage are Thailand, Malaysia and the Philippines. The New Asia Fund was designed to invest in smaller Japanese companies (particularly over-the-counter companies), stocks in other Asian countries, and non-public investments, including venture capital. Of the portfolio, about 62% is invested in Japan, 12% in Hong Kong, 8% in Thailand, and much smaller amounts in other countries, down to 0.5% in Malaysia. In terms of industry allocations, about 42% is invested in domestic services, 25% in manufacturing, and 25% in technology stocks. The New Asia Fund is currently selling at about a 20% discount, and she attributed the discount largely to the difficulty investors have in understanding what the fund is doing.

In contrast to the New Asia Fund, the Korea Fund has always sold at a premium, one that reached 150% before the market crash of 1987 and that is currently about 87%. A question was raised whether the opening of the Korean stock market to foreigners, which seems likely to take place within a few years, will eliminate the high premium. Her answer was that first, the opening is likely to be gradual and has already been delayed, and that second, a shrinking of the premium is quite likely but it will probably take place more through a rise in net asset value than by way of a decline in price. This is what happened to the Japan Fund when the Japanese market was opened.

28. PUBLIC VS. PRIVATE VALUES: IMPLICATIONS OF THE GLOBAL MERGER BOOM (Fall, 1989)

Lawrence S. Speidell, Trustee of Batterymarch Financial Management, distributed a paper entitled Corporate Restructuring: Valuation Fad or New Era.

He began his presentation by putting current merger and acquisition activity into a historical perspective. There have been five merger waves since the industrial revolution:

- 1893-1904: Monopoly consolidations
- 1915-1929: Oligopoly consolidations
- 1940s: Sales of private companies due to estate taxes
- 1950-1969: Conglomerate era
- 1980s: Corporate restructurings

Speidell saw the current merger activity as differing in important respects from activity in previous waves. The number of transactions in 1988 was actually much lower than the lower in 1969, but the dollar value of mergers reached an all-time high in 1988. In 1988 cash payments to stockholders were high, reaching the highest percentage since 1966. And finally, the "going private" phenomenon characterizes the current wave.

He described three underlying causes of the current merger wave. One might be called
the recovery of corporate America. In 1966, the equity market valued American corporations at 113% of replacement cost. By 1975 the ratio had dropped to 47%, and today it is at about 70%. Corporate equities may be underpriced today, and the current merger activity may then simply represent arbitrage by corporations realizing the extent of the underpricing.

Another cause of the current wave of restructurings may be a shift in pricing methodology. From about 1950 to about 1970, the stock market was dominated by individuals, with their own stock valuation methodologies. From about 1965 through 1985, institutional investors took over dominance of the market, with different valuation models. And from about 1980 to the present, corporate buyers have played a dominant role in the market for corporate control, with still another valuation methodology. Institutional investors, relying heavily on traditional accounting conventions, may be attaching much lower values to corporate equities than those arrived at by corporate investors, relying much more on cash flows and replacement costs.

Finally, the current merger activity may be the result of globalization. Japanese corporations, in particular, appear to be seeking diversification and are finding attractive investment opportunities in the United States.

Speidell displayed tables identifying for a number of industries the extent of merger activity and the levels of premiums being paid in takeovers. He went on to describe some of the analysis underway at Batterymarch to compare valuations of companies in various industries with the prices being paid in takeovers in those industries. The object was to see whether there are bargain purchases available and if so in which industries. Where the bargains exist, Speidell thinks the explanation lies in hidden assets. Batterymarch is attempting to value some of these assets. For example, capitalizing R&D and advertising expense will account for the long term value added that does not appear on the books of the corporation. Hidden assets appear to be very significant in technology stocks, and in consumer stable and consumer cyclical stocks.

In looking to the future, Speidell saw an emerging crisis of public ownership, which is needed less than it was in the past because of the availability of large pools of capital for private financing. Public ownership may be dangerous to management, because it exposes them to contests for corporate control. And those corporations that are publicly owned are likely to be seeking ways to reduce the potential for stockholder action that might unseat them.

What this crisis may lead to is increased Japanese ownership of United States corporations, increased ownership by large financial institutions (perhaps by way of LBO funds), and the conversion of common shares into little more than participating preferred shares. At the present time, the IRRC ranks the United States highest among industrial companies in terms of shareholder rights. And Speidell believes this makes the cost of common equity lower in the United States than anywhere else in the world. His closing hope was that we can preserve in this country both public ownership and the high level of rights that go with ownership of common shares.

29. VALUATION FACTORS ACROSS COUNTRIES (Spring, 1988)

William E. Jacques, Chief Investment Officer, Martingale Asset Management, distributed a paper by himself and Dan Rie, Vice President of Colonial Management Associates, entitled Valuation Factors Across Countries.

Jacques opened the presentation with a general discussion of whether valuation models must be country specific, or whether a global valuation model is feasible. One might argue that national stock markets are integrated and will become even more integrated by way of international capital flows. But one can also argue that a number of elements favor segmentation. These include political risks, local tax systems, transaction costs, trade restrictions, local tastes and preferences, and the fact that most common stock is owned by the local investment community.

Turning to past work that has attempted to resolve the integrated or segmented argument, Jacques referred to some basic theoretical work, to international tests of the Capital Asset Pricing Model, to correlations of stock returns with local market measures and global factors, to comparisons of multinational companies with a variety of single nation companies for diversification effects, and to tests of risk factors. The overall conclusion appeared to be that there is more support for a picture of segmented national markets than for a concept of a globally integrated market.
Dan Rie continued the discussion, describing the model -- the Empirical Pricing Model -- and the data that had been used to test it. The general form of the model is as follows:

\[ \text{Price}_{ict} = a_{1ct} \text{VAR1}_{ict} + a_{2ct} \text{VAR2}_{ict} + \ldots + a_{ntct} \text{VARn}_{ict} \]

where

\( \text{Price}_{ict} \) is the price of stock \( i \) in country \( c \) at time \( t \),

\( a_{ntct} \) is the coefficient on variable \( n \) for country \( c \) and time \( t \),

and

\( \text{VARn} \) is one of six variables.

Two kinds of data were used -- historic data from Morgan Stanley Capital International, and earnings forecasts from IBES. Data were selected for September 1987 and for December 1987, straddling the market decline of October.

The six variables used to explain price were: most recent reported earnings per share, dividends per share, forecasted earnings growth, beta, book value per share, and size (measured by market value decile). In reviewing the data, Rie commented on some relationships that had been uncovered, quite apart from the regression model above. For example, although price/earnings ratios are very much higher in Japan than in the United States and the United Kingdom, price/sales ratios are not very different. This suggests that the apparently very high valuations of Japanese stocks may be a function of Japanese accounting.

In general, it appeared that the earnings forecasts from IBES provide more explanatory power for stock prices than do historic earnings figures, especially in the U.S.

Jacques returned to discuss the conclusions reached from the pricing model. It turns out that earnings are the most important factor explaining stock prices in Japan and in the U.K., and the second most important factor in the U.S. Company size is the most important factor in the U.S., and the second or third most important in Japan. It seems to have little importance in the U.K. Future earnings growth (the IBES forecast divided by the historic earnings) is important in the U.K., but not in Japan and the U.S. Dividends are important in the U.K., but not in Japan and the U.S. Book value is quite important in Japan (it ranked second and third) and somewhat important in the U.S. (ranking third) but not at all important in the U.K. Beta was not important in any of the three markets.

In conclusion, Jacques felt that the research had identified significant differences in the factors that determine stock prices among the U.S., the U.K., and Japan. The indication is that to be useful a valuation model must reflect, for the stocks of a particular country, the factors that are important in that country.

30. ACTIVE INTERNATIONAL ASSET ALLOCATION WITHOUT FORECASTING (Spring, 1988)

H. Gifford Fong, President, Gifford Fong Associates and Oldrich A. Vasicek, Senior Research Associate, Gifford Fong Associates, distributed a paper entitled, Forecast Free International Asset Allocation.

Fong began by comparing the proposed multiple asset performance strategies (MAP) model with the traditional asset allocation model. The traditional model requires as input an expected return for each class of assets, a measure of the uncertainty of return (generally a standard deviation) and a set of correlations among asset classes. The output of such a model normally describes an appropriate allocation among the asset classes, and identifies the uncertainty of return associated with the allocation. The model will be satisfactory if the user is confident of the specifications of expected returns. Indeed, if returns can be predicted with substantial accuracy, the traditional model will almost certainly outperform the model proposed by Fong and Vasicek.

But for cases where investors do not have much confidence in their ability to forecast returns, the MAP offers a methodology that requires no return forecasts at all.

The MAP model is based upon option pricing theory. Call options ordinarily offer the purchaser of the call an option on a single security. However, one can theorize a call option offering the holder a choice among several assets, so that the call can ultimately be exercised on the asset that achieves the highest return. While such a call option cannot be purchased as such, it can be synthesized. The construction of the synthesized option was not discussed in this presentation, but had been expounded by Robert Ferguson at a previous Q Group Seminar in the Fall, 1985.
In addition to avoiding the need to specify expected rates of return, MAP also offers the opportunity to achieve a minimum return. Because the synthesized option is an option on the best performing of several assets, and because one of those assets can be a risk-free asset with a positive assured rate of return, the investor can be assured this rate of return less the cost of the option. The risk-free asset might be a zero coupon bond or an immunized bond portfolio.

Fong observed that since MAP is based upon option valuation methodologies, it is subject to the weaknesses in those methodologies. He discussed some differences among option value models and pointed out that extensions of the Black-Scholes model have dealt with some of the original weaknesses.

Working with three stock indexes, the S&P 500 for the U.S., the Morgan Stanley Capital International Stock Index for Japan, and the MSCI Stock Index for the U.K., Fong and Vasicek had simulated rates of return for the MAP model for 1978-1987. In performing the simulations, they had assumed monthly rebalancing, and had calculated standard deviations and correlations from 36 months of historic data. The geometric mean result for the MAP model was better than the geometric mean for investment in the U.S. or in the U.K., but fell behind the mean result for Japan. (It was also superior to the geometric mean return on the MSCI world stock index.)

A question was asked whether the MAP model can cope with discontinuities in trading in the futures market. Fong answered that discontinuities can be coped with, and observed that his firm had been managing portfolios following the MAP model through the market break in October 1987.

31. A GLOBAL SEARCH FOR VALUE: EXPECTED RETURN AS A FUNCTION OF PRICE TO BOOK VALUE AND RETURN ON EQUITY (Spring, 1988)


He explained the "Wilcox measure" of value as based upon the proposition that there is a "correct" relationship between the price/book value ratio and the return on equity for a company. A scatter diagram of points representing U.K. stocks, where price/book value is plotted vertically and return on equity is plotted horizontally, indicates that a high price to book value generally accompanies a high return on equity. A least squares regression can be used to establish a relationship between the price to book ratio and the return on equity. (Actually, Wilcox regressed the logarithm of the price to book ratio on the return on equity.) Applying a regression line to the scatter plot enables one to identify the undervalued stocks (those for which the plotted point lies below the regression line) and the overvalued stocks (represented by the points above the line). Further, one can quantify the extent of under or overvaluation, and calculate the return that would be achieved on those stocks as the price adjusts to move the point to the regression line.

Wilcox has used the model primarily for ranking stocks within each of about 20 national markets. Results, since the model was introduced in the summer of 1987, have been good except in the U.S.

Wilcox discussed a number of implications of the model, going beyond stock selection in individual countries. He argued that for each country at any point in time there is an expected return for all stocks. This return can be identified from the regression line: it is the return on equity corresponding to a price/book value ratio of 1. He displayed charts of expected returns computed in this way for 16 countries, and charts of equity return premiums as well, calculated by subtracting long bond yields from expected equity returns for each country. These comparisons were of course in terms of local currencies, and did not incorporate any expected movement in exchange rates. They did suggest a basis for making a selection among countries.

Expanding on the logic of the model, Wilcox pointed out the superiority of relating the price/book value ratio to the return on equity over a selection method based simply on ranking by price/earnings ratio or a method combining a price/book value ratio and a price/earnings ratio.

In concluding, he pointed out some of the difficulties he has experienced in applying his model. First, it is hard to obtain reliable data and he has had to devise some filter rules to eliminate the most doubtful data. The return on
equity that he has used is the most recently reported number, and he would prefer to be using forecasts. As with all such models, there is some likelihood that cheap stocks will remain cheap and apparently overvalued stocks will remain apparently overvalued. He has begun to explore the possibility that the price/book ratio may never move to the equilibrium regression line value, but that it may still be worth tracking in order to determine when it is unusually high and when it is unusually low.

In answer to a question about variations in accounting practices from country to country, Wilcox pointed out that the model is still valid for ranking stocks within a country.

In answer to another question, he agreed that his method of valuation makes no risk adjustments, and one might expect to find high risk stocks on the undervalued list.

32. A DIVIDEND DISCOUNT MODEL APPLIED TO THE JAPANESE MARKET (Spring, 1988)

Yusaku Sakaguchi, Vice President, Quantitative Group, Nomura Investment Management, began his presentation by reviewing five valuation models in current use in Japan. The first might be called a fundamental model, making use of price to earnings ratios, price to book value ratios, and similar measures. The second model, following the tactical asset allocation models in use in the U.S., makes use of the yield spread between stocks and bonds. A third type, macrofundamental models, make use of macroeconomic variables including production, inflation and the money supply. A fourth type of model is essentially technical in nature. Finally, the fifth type of model is the dividend discount model.

A few charts tracing price earnings ratios over the past 15 years or so, indicated that the Japanese stock market is quite different from the markets in the U.S., the U.K., and Germany, and probably from a number of other stock markets. Price earnings ratios for Japanese stocks have risen very steeply in the past three or four years, while they have declined in other countries. Indeed, Japanese price earnings ratios were rather stable through most of the '70s, at around 20, and have tripled to a level of 60 only in 1986 and 1987.

Sakaguchi identified seven determinants of price earnings ratios in Japan.

First, interest rates are important and in Japan these are very low. Second, growth prospects are important and these appear to be very high at the present time in Japan. Quality of earnings is important, and Japan has its own unique accounting standards. Hidden assets can be important, and market values of Japanese corporate assets are far in excess of balance sheet cost based amounts. Fifth, the structure of share ownership, and sixth, the structure of market participants in Japan are both important. As in the U.S., individual trading as a proportion of total stock trading has declined substantially in recent years. Finally, taxation is an important element. The average corporate tax rate in Japan is now about 55%, but a number of corporations pay as much as 2/3 of before tax income in the form of taxes.

The price level of Japanese stocks raises three key questions. Why is the price/earnings ratio so high in Japan? How do long-term interest rates in Japan affect the prices of common stocks? What are investor expectations in Japan? To a large extent, the dividend discount model to be presented by Sakaguchi was designed to answer these questions. While American practitioners are accustomed to using the model in order to establish "true values" and to contrast these values with market values, the model designed at Nomura is intended to provide an explanation for the current level of Japanese stock prices. It is important to bear this distinction in mind when considering how the Nomura model is put together.

Sakaguchi discussed three variations of the dividend discount model, variations that should be familiar to the U.S. practitioner. The first version of the model assumes constant perpetual growth. And the formula is the familiar Gordon-Shapiro expression:

\[ P_0 = \frac{D_0(1+g)}{k-g} \]

where

- \[ P_0 \] is the current price,
- \[ D_0 \] is the current dividend,
- \[ g \] is the expected growth rate in dividends,

and \[ k \] is the discount rate.

A second version can be called the two period growth model. In this case, we assume
that dividends will grow at one rate for a finite period of time, and will then shift to a second rate for another finite or infinite period of time. The expression now is:

\[ P_0 = D_0 \sum_{t=1}^{A} \frac{(1+g_1)^t}{(1+k_t)^t} + D_A \sum_{t=A+1}^{N} \frac{(1+g_2)^t}{(1+k_t)^t} \]

where

A is the number of years dividends are expected to grow at the rate \(g_1\), and \(g_2\) is the growth rate anticipated for years following the first A years.

A third model divides the future into three periods, with different growth rates for each period. The first version of the model had proved unsatisfactory, and Sakaguchi displayed some of its results. The two-stage version, however, showed promise and that is the one that Nomura has pursued.

The two-stage model can be simplified and expressed in the following form:

\[ P = V_1 + KV_2 \]

where \(V_1\) now represents the value of the dividends to be received over the first growth stage (that is through the first A years, estimated at Nomura to be 4 or 5) and \(V_2\) represents the value to be derived from dividends in the years following the first A years. The parameter \(K\) is a constant that has to be estimated. This is an important constant, because it represents the relative value Japanese investors place upon the long run future of a company.

Determination of \(V_1\) requires an explicit forecast of dividends for the next 4 or 5 years, and the application of a discount rate. The determination of \(V_2\) is a little more complicated. Sakaguchi proposed the following expression:

\[ V_2 = \frac{D + \alpha \text{EPS}}{r} + \frac{(\text{EPS} - D) \times \text{ROE}}{r^2} + \frac{1}{r^2} \]

The first term on the right-hand side of this equation represents the present value of an infinite stream of unchanging dividends. The second term represents the present value of an infinite stream of growth, calculated by multiplying the return on equity by the earnings retention ratio. For practical purposes, it was assumed that the retention rate would remain constant at 66% and that the return on equity would remain constant.

The next step was to establish the appropriate discount rate. The method described by Sakaguchi was first to determine a risk premium, and then to add this risk premium to either a long term government bond yield or to the real interest rate. Experimentation established that the government bond yield led to satisfactory results in the 1970s, but that the real interest rate was the better one to use for the 1980s. Estimation of the risk premium was based upon a regression analysis, making use of the government bond yield (or the real interest rate) as the independent variable, and the expected return on stocks as the dependent variable. The expected return on stocks was derived from the constant growth version of the dividend discount model. Once the risk premium had been determined, it was added to the long government yield or the real interest rate to arrive at the discount rate to be incorporated in the two-stage dividend discount model.

The last element in the model to be evaluated is the constant \(K\), the parameter by which \(V_2\) is multiplied. The parameter \(K\) was hypothesized to be a function of the real interest rate and of the Marshallian \(k\). This latter \(k\) is equal to the money supply divided by gross national product plus net imports. The value of \(K\) was determined by regressions on the real interest rate and the Marshallian \(k\). The end result of using the final version of the two-stage dividend discount model is shown in the following table.

| Year | V1  | V2  | \(^{\wedge}\) | DDM Components of Stock Price
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<td>P</td>
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<td></td>
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<td>actual price</td>
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<td></td>
<td>K actual value</td>
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<tr>
<td>1972</td>
<td>16.25</td>
<td>186.78</td>
<td>235.32</td>
<td>179.74</td>
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<tr>
<td>1975</td>
<td>17.29</td>
<td>187.42</td>
<td>190.25</td>
<td>173.88</td>
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<tr>
<td>1980</td>
<td>21.02</td>
<td>233.49</td>
<td>248.75</td>
<td>269.27</td>
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<tr>
<td>1986</td>
<td>27.31</td>
<td>664.12</td>
<td>853.55</td>
<td>851.24</td>
</tr>
<tr>
<td>1987</td>
<td>29.13</td>
<td>924.37</td>
<td>1250.93</td>
<td>1117.55</td>
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The first observation to be made is that the price determined by the model is very close to the actual price in 1980, 1986, and 1987, but rather far from the actual price in the early '70s. In its final form, the model appears to have captured
the elements that support the current level of Japanese stock prices.

The next observation has to do with the relative importance of V1 and V2. In the early 1970s, investors were apparently attributing approximately 10% of the value of a stock to the dividends over the next 4 or 5 years, and 90% to the dividends to be received later. By 1987, something like 3% of the value of a stock is attributable to the dividends to be received over the next 4 or 5 years, and roughly 97% is attributable to dividends beyond that point in time. This shift in emphasis is represented in the changing value of K. (The actual value of K was determined by subtracting V1 from the actual price and dividing the result by V2.)

Sakaguchi offered some comments on the meaning of his parameter K. The higher the value of K, the more the emphasis on a low dividend payout ratio and high resulting growth. He commented that for U.S. stocks, valued in the U.S. marketplace, the value of K is probably less than 1. U.S. investors are likely to place greater value on dividend payout and less value on growth through retained earnings than are Japanese investors. There are other interesting aspects of K. It is a function of the money supply in Japan, and the real interest rate. This suggests a direct connection between those two economic factors and the level of stock prices in Japan. Sakaguchi also indicated that application of the two-stage dividend discount model to different industry categories had revealed differences in the importance of real interest rates and the Marshallian k.

33. DO U.S. ASSET ALLOCATION DISCIPLINES WORK GLOBALLY? (Spring, 1988)

Robert D. Arnott and Roy D. Henriksson, Vice Presidents, Salomon Brothers, Inc., distributed a paper entitled: A Disciplined Approach to Global Asset Allocation. Henriksson began the presentation with a general discussion of the reasons for diversifying a portfolio into international markets, and appropriate ways of handling foreign currency risk.

The most obvious reason for investing in foreign markets is increased diversification and therefore reduced risk. Research at Salomon Brothers had led to a recommendation that foreign currency exposure be fully hedged. Hedging will reduce the volatility of a foreign investment substantially, and does not appear to reduce expected returns. The expected return for taking currency risk appears to be very close to zero.

The question of timeliness always arises when an institution is considering entering foreign markets. There may be a suspicion that foreign currencies are about to decline in value. The answer to this concern is to hedge fully the currency risk. In addition, there may be some concern that a foreign market is close to its peak. But this is no different from concerns that the U.S. market may be close to its peak.

Turning to consideration of relative valuation of foreign markets, Henriksson indicated a number of elements one must take into account. Unique accounting and tax rules may be important in valuing a market. Differences in interest rates among markets can be important. Growth opportunities are important and may vary from country to country. Risks may differ among countries, and different types of risks are relevant to different kinds of investors.

Arnott continued the presentation, beginning with a discussion of asset allocation strategies. It is easy to justify international investing as part of a long-term asset allocation policy. There may be some question, however, about whether a tactical asset allocation strategy, in effect a timing strategy, can work abroad as well as it does in the U.S. Tactical asset allocation is somewhat analogous to sector rotation within a common stock portfolio. We have learned in the U.S. market to establish objective measures of the returns available on different asset classes. Tactical asset allocation involves changing the mix of asset classes to take advantage of opportunities indicated by those expected return measures. The process is inherently contrarian, involving the purchase of assets that are generally in disfavor.

There are four assumptions underlying a disciplined approach to asset allocation. First, we can rely on the markets to tell us what rates of return are available on different asset classes. Second, the expected returns reflect the market's judgment respecting the relative attractiveness of the various asset classes. Third, there are normal equilibrium relationships among these expected returns. And fourth, as the expected returns move away from their normal equilibrium relationship we can predict with some confidence that they will move back
again. To implement a tactical asset allocation strategy we need a procedure that will provide a good measure of disequilibrium when it arises.

Arnott presented some empirical results, beginning with relative return coefficients for 15 countries, based simply on the difference between the stock earnings yield and the bond yield in each country. Taking Japan as an example, every hundred basis point difference between the Japanese stock market earnings yield and the Japanese 10 year bond yield translated into an average 139 basis point difference in the relative performance of stocks versus bonds in Japan over the subsequent month. Differentials between the stock earnings yield and the cash yield and between the bond yield and the cash yield can also be exploited. These analyses were all based on the assumption that the equilibrium risk/return tradeoff remains stationary, and current differences between the stock earnings yield and the bond yield were compared with long run differences. Arnott next turned to a dynamic comparison, based on the proposition that the equilibrium relationships between asset classes can change, and that the comparison of current differences should be against a recent rather than a long run equilibrium. More specifically, the equilibrium relationship was taken to be the most recent 24 month average. The relative return coefficients, using this dynamic comparison, increased substantially.

He had found that in the United States a rise in real interest rates translates into a significant performance penalty for stocks versus bonds. But this relationship does not seem to hold in a number of foreign countries. In fact, only in the U.S., Germany, and the Netherlands does it have any value. Arnott's inclination is to discard this relationship altogether, preferring to work only with those that are consistent across a large number of countries.

Arnott continued, to consider five more variables. The first was stock return variance. This variable is not particularly effective by itself in signaling an asset allocation strategy, but it works well in conjunction with other variables. The rate of change in retail sales turns out not to be a useful indicator. The rate of change in the producer price index is quite useful, as is the level of unemployment and the rate of change in unit labor costs. High unemployment is generally correlated with good subsequent stock performance, as is falling unit labor costs.

In closing, Arnott commented that he did not yet have a tactical asset allocation model for use in foreign markets. The tests he had reported, however, suggested that such a model could be constructed and would be valuable.
INVESTMENT MANAGEMENT AND INCENTIVE FEES

34. THE INVESTMENT MANAGEMENT BUSINESS IN THE '90S (Spring, 1990)

Arthur Zeikel, President of Merrill Lynch Asset Management, delivered the opening address at the Spring 1990 Seminar. He distributed a paper entitled, Investment Management in the 1990s: An Assessment of Visible Trends. He began with three propositions: first, present conditions are not conducive to a world boom in financial assets. Second, we are just coming out of a period of excessive returns on equities, and it is not rational to believe that these returns can continue into the early 1990s. Since we cannot count on the market delivering easy high returns, active management will become much more important than it has been in recent years. Third, this is a time for lower expectations and longer term horizons.

Zeikel emphasized his belief that recent years have seen an excessive leveraging which has led to a vast supply of low grade paper for which there are no natural buyers. Working off this inventory will take some time.

The two dominant trends he sees for the future are: first, investing around the world will be a true growth business, although the nature of the growth will lead to increased competitive pressures for most organizations. And second, the appeal of ownership of individual securities has declined and will continue to do so. There is a growing preference for the ownership of baskets of securities, or mutual funds. The number of shareholders, the number of actively traded companies, and the number of stock exchanges will all increase in the years ahead. The increase reflects a general expansion in worldwide capitalism, the failure of communism, the fact that Russia appears to be joining the world, and the fact that economic, political, and religious freedoms cannot be separated.

While one dominant trend will be growth, future growth will be very different from past growth. For both individual and institutional investors, the attractiveness of owning individual securities has declined and is being replaced by packaged investing. Investors want to own portfolios rather than specific securities. This change in preference stems from increased anxiety over the volatility of individual securities, and fears that the investment game is rigged against many participants. While these fears may be unjustified, the fact that they exist will drive the form of investment. Individuals will not come back into the market as they once did during bull markets. Instead, they will move to mutual funds.

Institutions are also likely to shift toward passive investing, indexing, and arrangements that will shift assets away from so-called traditional investment management supervision. Zeikel quoted the London Economist to the effect that "pension funds might be wiser to decide which markets they should be in and then use indexed portfolios to track that market".

One manifestation of the shift from an emphasis on individual securities to an emphasis on portfolios is the rise in basket trading, something that both the SEC and the New York Stock Exchange are encouraging.

Coming out of the major trends Zeikel suggested, will be a number of developments:

Competition to manage money for pension funds will become fierce and we will see a dramatic reduction in fees.

There will be increased use of derivative securities offering improved opportunities to match risk preferences of investors.

Research is being squeezed and will be squeezed further with reduced availability of commissions to support research. This will lead to reduced efficiency in securities markets so that active management can accomplish more.

We may be approaching a period during which active management will clearly outperform passive management. Successful active management will require:

1. A structured decision-making process that can be easily defined
2. A stated investment philosophy applied consistently
3. A clearly stated and effective sell discipline
4. Continuity of key personnel.
He closed by quoting Peter Bernstein to the effect that "the single most overwhelming influence out of the past has been nothing directly to do with portfolio management, security analysis, or financial markets. Rather, it was a gigantic technological innovation: the computer, or more particularly, the PC".

35. AN OVERVIEW OF ANALYTICAL ELEMENTS OF AGENCY THEORY (Spring, 1989)

Albert S. Kyle, Assistant Professor at the Haas School of Business Administration, University of California, Berkeley, distributed a paper entitled An Intuitive Introduction to Agency Theory with Applications to Money Management.

Kyle introduced his presentation as a non-mathematical review of what has come to be known as the "principal-agent problem". A basic element of the problem is what is termed "asymmetric information". In a principal-agent relationship, the agent has access to information that is not available to the principal. When the agent acquires the information after contracting with the principal, we say there is a "moral hazard". When the agent already has the information before contracting with the principal, we say there may be "adverse selection". Kyle observed that in order to describe the principal-agent problem we must consider the utility levels of both (and risk aversion is important here), the nature of the information that is available only to the agent, the actions undertaken by the agent, and the contracting environment.

With respect to moral hazard, Kyle pointed out that this may involve actions of the agent that are hidden from the principal or information available to the agent that is hidden from the principal. The hidden actions may be more beneficial to the principal than to the agent, but costly to the agent and not to the principal. In the context of money management, research may be an example, and minimizing transactions costs may be another. With respect to hidden information, again in the context of money management the agent (the money manager) will have knowledge of the distribution of security returns that is not available to the principal (the pension plan sponsor, for example). With respect to adverse selection, the agent can generate signals to the principal that will induce a principal-agent contract.

Kyle raised the question whether principal-agent problems necessarily lead to inefficiency. The answer depends upon the benchmark by which inefficiency is judged. The proper benchmark corresponds to the case where the principal is fully informed.

The simple principal-agent problem can be extended in ways that make it much more complicated. If the contracting process is repeated through time -- as in the case of a plan sponsor renewing the contract of an investment manager -- past outcomes can influence subsequent contracts and outcomes. Further complications result when the simple principal-agent relationship is extended to cover the relations between the investment manager, on the one hand, with brokers, dealers, and the like, and the pension fund officer of the plan sponsor with senior management, shareholders, and employees.

Government policy also plays a role. Kyle raised the question whether government policy has a beneficial or harmful effect. His opinion was that government policy can never alleviate the moral hazard problem, but might modify signalling to improve economic efficiency.

Turning specifically to the relationship between an investment manager and a pension fund, he observed that the manager chooses both the mean and variance of the distribution of portfolio returns, so that hidden actions and hidden information are both important simultaneously. One might think that because the outcome of the manager's activities is known precisely in the form of return performance, the principal has little to be concerned about. But there are problems with the track record of a manager. A manager can create a false track record, for at least a limited period of time, by writing far-out-of-the-money options, taking in the premiums and hoping the options never expire in-the-money. While the track record is used for signalling, in order to induce a contract with a plan sponsor, there may be many ways in which a manager can present a performance record that has been manipulated to appear highly favorable.

From the point of view of the principal, eliminating the moral hazard problem and achieving the solution that would be obtained if both the actions and information of the agent were observable to the principal, is the "first-best solution". Game theorists would achieve this
solution with "forcing contracts". One type of forcing contract is called "selling the store" and in the context of money management this might take the form of the manager guaranteeing a particular return (for example, matching the performance of the S & P 500 Index) and taking the risk (and reward) of any deviations in actual performance from that standard. In other words, all of the risk is shifted to the manager. Kyle observed that this is probably not practical, although indexing may be appealing to a number of plan sponsors. The second type of forcing contract is called "boiling in oil", which simply means imposing an extraordinarily severe penalty on a manager whose management efforts are clearly unsatisfactory. Kyle's comment was that since it is so difficult to identify clearly unsatisfactory effort in poor performance results, this type of forcing contract is not likely to be useful in the money management case.

A third possible solution lies in the use of optimal risk-sharing contracts. If we assume that there is hidden information but no hidden actions, no transactions costs, no point in conducting research in the hope of beating the market, and no private trading by the agent, then the appropriate contract can result in a first-best optimal outcome. The manager should be compensated by a combination of a fixed fee and a share of the portfolio's return. This is equivalent to a "linear risk-sharing rule". Adjusting the share of return that goes to the manager can achieve a first-best optimal outcome.

The assumptions listed above are not likely to be justified, and we therefore turn to considering achieving a "second-best solution". One such solution is called "efficiency wages". The plan sponsor pays the manager a fee that is sufficiently above the minimum acceptable to the manager that the manager values the relationship and tries hard not to be terminated. Kyle thought this is the solution that is probably chosen by most plan sponsors. Another solution may involve restricting the activities of the manager to try to foreclose any that are not in the best interests of the plan sponsor. An alternative to restrictions is monitoring. Monitoring of course involves expense and the manager may attempt to game the monitoring. Kyle offered a number of suggestions as to how monitoring might be made most effective.

36. ESTIMATION RISK AND INCENTIVE CONTRACTS FOR PORTFOLIO MANAGERS (Spring, 1989)

Susan I. Cohen, University of Illinois, Champaign, Ill., and Laura T. Starks, Department of Finance, University of Texas, Austin, TX, distributed a paper entitled Estimation Risk and Incentive Contracts for Portfolio Managers. Cohen began the presentation by describing the purpose of the research as being to model the fiduciary relationship between a mutual fund manager and an investor in the fund. The two authors had investigated the impact of the compensation schedule or arrangement on the choices made by the manager. The model was essentially an agency model, in which the manager is the agent and the investor is the principal. In this particular model adverse selection was not considered; the only problem was moral hazard. The problem arises because the manager chooses the fund portfolio and the investor cannot tell exactly how risky the portfolio is.

There are two types of risk associated with the portfolio. The first is systematic risk, risk that the manager does not control but that comes from the market. The second is estimation risk, that arises from the inability of the manager to estimate perfectly the parameters of the returns generating distribution. The manager can reduce estimation risk by working harder. The model covers one period only. The investor gives the manager $1; the manager selects the portfolio; the portfolio earns a return $R$; the ending portfolio $R \times 1$ is liquidated; the manager is paid a fee; and the investor keeps the balance. The return on the portfolio is assumed to conform to the capital asset pricing model, and is given by

$$R = R_f + \beta [E(R_m) - R_f + \sigma_m (Z_t)]$$

where $R_f$ is the risk free rate, $\beta$ is the portfolio's beta, $E(R_m)$ is the expected market return, $\sigma_m$ is the market standard deviation, $Z$ is a standardized normally distributed variable, and $\rho$ is the correlation between portfolio and market, assumed to be 1.0.

The beta of the portfolio is assumed to be a random variable, independent of $Z$, and unobservable with precision. The expected
value of the beta is represented by \( b \), and the variance by \( b^2/a \), where \( a \) is the effort level chosen by the manager when estimating the beta. By making greater effort, then, the manager can reduce the variance.

The investor's utility depends only on wealth, and can be expressed as initial wealth plus the terminal value of the portfolio less the compensation paid to the manager. The utility of the manager is a function of wealth and effort made in managing the portfolio. Wealth in turn is the sum of initial wealth and compensation for management. Both the manager and the investor are assumed to be risk averse. The compensation contract is assumed to be linear, and takes the following form:

\[
\text{Manager Compensation} = K_0 X + K (X - X_m)
\]

where \( X \) is the ending value of the portfolio, and \( X_m \) is some prespecified benchmark portfolio.

The equation incorporates a symmetric performance fee.

Approximating the expected utility with respect to the market as quadratic, we can derive an expression for the expected utility of the manager and one for the expected utility of the investor. If there were no estimation risk, the level of beta maximizing expected utility to the manager might be the same as the level of beta maximizing expected utility to the investor. The match would depend simply upon whether the manager and the investor were equally risk averse. But it turns out that where there is estimation risk, the manager will aim at a lower expected beta (in order to reduce the variance in the beta which in our case is assumed to be related to the expected beta). It further turns out that the manager's preferred combination of expected beta and level of effort will never match the investor's preferred combination of beta and effort. Hence a first best optimal solution cannot be achieved through a linear contract. Three further conclusions can be reached from the linear contract. First, if the investor is no more risk averse than the manager, the manager will choose a less risky portfolio than the investor would prefer and will make less effort than the investor would like. Second, if the investor is much more risk averse than the manager, the manager will always choose a riskier portfolio than the investor would prefer and sometimes the manager will work too hard and sometimes too little to suit the investor. Third, the investor should prefer a manager and a compensation contract combination in which the manager is less risk averse than the investor.

Laura Starks continued the presentation, by reporting empirical evidence on changes in incentive fee contracts. Until 1971, mutual fund managers were permitted to be paid on an incentive basis that in many cases was asymmetrical. An example was the contract for Growth Fund of America, which provided a fee of .50% of average annual daily assets plus 3.5% or minus 0.25% depending on performance of the the New York Stock Exchange composite index. After 1971, the Securities and Exchange Commission required that these incentive contracts be symmetrical, and the Growth Fund of America contract was revised to provide for 0.75% of the annual average daily assets plus or minus 0.50% depending on relative performance. The empirical data consisted of weekly rates of return for 1969 through 1970, and for 1972 through 1973, for 35 mutual funds which employed asymmetric contracts during the first period and symmetric contracts during the second. A control group consisted of 35 funds that were not affected by the SEC rule. For both time periods, the affected funds had higher average betas than the unaffected funds. They also had lower average weekly returns. The betas of the affected funds rose significantly from the first to the second period. The betas of the unaffected funds dropped insignificantly. The result must be interpreted in the context of many increases in the fixed fee (26 funds), many decreases in the bonus fee (29 funds) and many decreases in the penalty fee (18 funds). A more useful result is reflected in the following regression, for the 35 affected funds.

\[
\text{Change in beta} = 0.28 \text{ change in } K_0 \\
\text{ (.139)}
\]

\[
-0.035 \text{ change in } K_B \\
\text{ (.942)}
\]

\[
-0.419 \text{ change in } K_P \\
\text{ (-2.10)}
\]

The significant change in beta was related to the change in the penalty element of the fee, and the negative sign is what one would have expected.
37. AN INTRODUCTION TO INCENTIVE FEES (Spring, 1986)

Eugene E. Record, Jr., Senior Vice President, Thorndike, Doran, Paine & Lewis, introduced the subject of incentive fees, pointing out the amount and variety of quantitative research that is needed to establish an understanding of how incentive fees work and how they should be designed. He observed that one consequence of the establishment of incentive fees and the identification of appropriate benchmarks is that managers who truly provide superior performance will consistently achieve above average fees, while those whose performance is inferior will be consistently paid less.

Mary Ann Tynan, Vice President, Thorndike, Doran, Paine & Lewis provided a brief discussion of the history of incentive fees. (A paper by Eugene E. Record and Mary Ann Tynan, entitled An Introduction to Incentive Fees was distributed.) The Investment Advisors Act of 1940 has a general prohibition against incentive fees, with some exceptions. From 1970 until 1985 the chief exceptions were available for the management of mutual funds but not for retirement funds. In November, 1985, the Securities and Exchange Commission adopted a new rule to make incentive fees more widely available, and most importantly to make them available in the management of retirement funds.

The conditions for use of incentive fees are rather simple: first, either the beneficial owner of the account must have a net worth of at least $1 million, or the account must have at least $500,000 in assets. Second, the performance component of an incentive fee must be based upon a formula which includes both realized losses and unrealized depreciation if market quotations are readily available. If quotations are not readily available, realized losses must be counted, but unrealized depreciation need be counted only if unrealized appreciation is also counted. Third, the performance component must be based upon gains less losses during a period of at least one year.

It is significant that the performance upon which an incentive fee is based need not be related to a market index, and penalty fees are not required. In these respects, the new rules relax significantly the standards that were applied in past years to mutual fund management contracts.

Tynan cautioned that there are a number of rules at the state level that will still preclude the use of incentive fees, and the Department of Labor has not yet issued any authorization for incentive fees connected with ERISA funds. There was some discussion later in the session of the position the Department of Labor is likely to take, with a general expectation that authority to use incentive fees will be granted on a case by case basis.

Tynan closed by identifying four factors that should be considered by clients and managers in planning for the use of incentive fees:

A. The performance upon which fees are based can be relative or absolute. For example, the S & P 500 Index may serve as a benchmark, or the fee may be expressed simply as a percentage of net gain.

B. The length of the measurement period must be considered, as well as whether measurement periods will be discrete or whether a rolling period will be used.

C. A choice must be made between a pure incentive fee and a fulcrum fee. The incentive fee simply goes up with performance; the fulcrum fee goes up with good performance and down with poor performance.

D. A decision must be made with respect to the relative importance of a base fee and an incentive component.

Record presented some statistics for funds managed by Thorndike, Doran, Paine & Lewis/Wellington on an incentive basis. Eight funds with assets of $7.5 billion are managed on a symmetrical (fulcrum) incentive basis, in each case with a 36-month trailing evaluation period.

Drawing on data for the total of 42 mutual funds managed on an incentive fee basis, Record gave a picture of the use of benchmarks, time periods, base fees, and incentive fees now in use. The S & P 500 is clearly the most popular benchmark (the mutual funds have been subject to a rule requiring the use of a benchmark). The 36-month rolling period is clearly the most popular measurement period. Base fees range from 1 percent to 0.154 percent with a mean of 0.65 percent. Incentive fees add plus or minus 1
percent to plus or minus 0.075 percent, with a mean of plus or minus 0.20 percent.

Turning to the question whether incentive fees are likely to be higher or lower than the customary fixed fees, Record demonstrated why clients may expect a reduction in fees while managers expect an increase. Clients and managers are quite likely to have different expectations with respect to distributions of future portfolio rates of return.

38. INCENTIVE FEES  (Spring, 1986)

Mark Kritzman, Partner, New Amsterdam Partners, presented a paper entitled The Valuation of Incentive Fees. He described the purpose of his presentation as consisting of two parts: establishing a framework within which client and manager can negotiate a fee, and exploring the possibilities for "gaming" to see how a client might protect itself against possible gaming by the manager.

Kritzman showed graphically the relationship between the management fee and investment performance, for flat fees, symmetrical incentive fees, symmetrical incentive fees with a base and a cap, and finally asymmetrical fees. He pointed out that the relationship between the asymmetrical incentive fee and investment performance resembles closely the relationship between the value of a call option and the price of the underlying stock. And he developed from the Black Scholes Option Pricing Model, a model for the value of an incentive fee. The formula is as follows:

\[
V = d_1 [N(d_1) - N(d_2)] B + \frac{1}{2} \ln(\frac{P}{B}) - \frac{1}{2} \ln(\frac{S}{B}) - \frac{1}{2} \ln(\frac{S}{B}) - 2RS_p \sigma_p T^{1/2} \\
\]

\[
d_1 = \frac{(S_p^2 + S_B^2 - 2R_S p \sigma_p) T^{1/2}}{\sigma_p T^{1/2}} \\
d_2 = d_1 - \frac{(S_p^2 + S_B^2 - 2R_S p \sigma_p) T^{1/2}}{\sigma_p T^{1/2}} \\
\]

where 
\[
V = \text{value of incentive fee} \\
d = \text{participation in incremental return} \\
P = \text{price of managed portfolio} \\
B = \text{benchmark price} \\
S_p = \text{standard deviation of portfolio return} \\
SB = \text{standard deviation of benchmark return} \\
R = \text{correlation between portfolio and benchmark returns} \\
T = \text{measurement period} \\
N(\cdot) = \text{normal cumulative density function}
\]

Kritzman applied the valuation formula to a case where assets under management are $10 million, the participation in incremental return is 10 percent, the standard deviation of the managed portfolio and the standard deviation of the benchmark are both 15 percent, the correlation is .95, and the measurement period is one year. The value of the incentive fee turns out to be $18,900. On the assumption that the alternative flat fee for managing this portfolio would be $50,000, Kritzman concluded that the appropriate base fee would be $31,100, to make the expected total fee $50,000, whether the arrangement were for a flat fee or a base fee plus an incentive fee. So we have a basis for taking any incentive fee arrangement, and deriving the base fee to go with it, such that both client and manager should be satisfied with the total fee package.

Kritzman went on to discuss the sensitivity of the value of the incentive fee to a number of the parameters in the valuation formula above. Not surprisingly, the incentive fee value rises with the value of the portfolio (the quantity of money to be managed), rises with the length of the measurement period, and falls as the benchmark rises (that is, falls as the benchmark rate of return is increased). What is perhaps surprising is that as the standard deviation of the portfolio return rises, the value of the incentive fee declines, reaches a minimum, and then rises. The same relation holds between the value of the incentive fee and the standard deviation of the benchmark return. The value of the incentive fee declines as the correlation between the portfolio return and the benchmark return rises. Since it is the incremental return, rather than the portfolio return, that gives rise to an incentive fee, it is the standard deviation in this incremental return that adds value to the incentive fee contract.

Kritzman went on to discuss the possibilities for gaming on the part of the manager. The manager is in a position to change the standard deviation of the portfolio returns and the correlation between the portfolio returns
and the benchmark returns. And as he had previously demonstrated, the value of the incentive fee contract is a function of the standard deviation and the correlation. Kritzman showed that raising the standard deviation of the portfolio return from 15 percent to 25 percent brings the value of the incentive fee up from $18,900 to $46,800. And if at the same time the correlation is brought down from .95 to .75, then the value of the incentive fee becomes $67,600. The total fee then, base fee of $31,110 and incentive fee, turns out to be almost $100,000, or twice the anticipated total fee.

A lively discussion followed Kritzman’s presentation. A number of participants expressed support for a rolling time period rather than the use of discrete periods to reduce opportunities for gaming. Choice of the benchmark was considered to be very important, and specific statement of investment policy might be necessary to control the gaming Kritzman had referred to.

An important theoretical point was that the option valuation model of Black and Scholes supposes that the holder of the option is in a position to achieve full diversification, while the investment manager may not be in such a position, and hence the methodology used by Kritzman may produce a valuation of the incentive fee that is correct for the client but overstates the true value to the manager.

39. INCENTIVE FEES: PANEL DISCUSSION (Spring, 1986)

Eugene E. Record, Jr., introduced the panel on incentive fees. Jack Meyer, Treasurer and Chief Investment Officer, Rockefeller Foundation, presented a paper entitled Incentive Fees. The Rockefeller Foundation currently uses incentive fees for ten of its eleven equity and bond managers. In each case, the incentive is a fulcrum fee and is symmetrical. So the fee can be positive or negative and it can go down as far as it can go up. The result is a significant bonus to managers who outperform their universe of securities and a significant penalty for those who underperform.

For the Rockefeller Foundation, the base fee is calculated as:

\[
\text{Base Fee} = .80M_S \times \text{AAVG}
\]

where \( M_S \) = manager’s standard fee (50 basis points)

\[
\text{AAVG} = \text{average monthly asset value}
\]

The base fee is paid quarterly, and the incentive fee is calculated as:

\[
\text{Incentive Fee} = 100(R_R - (R_N + .80M_S)) \times 60,000
\]

where \( R_R \) = annual return on Rockefeller portfolio

\( R_N \) = annual return on normal (benchmark) portfolio

Meyer produced examples showing cases where the incentive fee added substantially to the base fee and where the incentive fee subtracted substantially from the base fee. The incentive fee is capped, and will not exceed plus or minus $360,000. Meyer suggested that for an aggressive manager it is important that the incentive fee percentage be relatively low and that the caps permit a wide range in compensation. This keeps the manager in the game even though performance is poor. For less aggressive managers, for bond managers for example, the incentive fee can have a higher percentage and the caps can impose a narrower range.

In summarizing the advantages for the Rockefeller fee structure, Meyer stressed that it is fair to the Foundation and to managers, that it encourages the managers to focus on details like transaction costs and dividend reinvestment plans that may add only a few basis points to the total return but are still worth many dollars to the Foundation, and that it keeps the manager focused on the benchmark, rather than whatever reference point makes the recent performance look attractive.

In discussing disadvantages, Meyer claimed there were none but that some would claim that the incentive fee arrangement will encourage managers to take excessive risk in catching up after a bad period. However, if the limits of compensation are set wide enough, then catch up efforts will present risk to the manager as well as to the Foundation. The use of the fulcrum is very important here, so that a manager can lose money by taking risks and performing poorly. It is sometimes alleged that incentive fees will lead to excessive risk taking,
but Meyer felt that once again the fulcrum fee dealt with this possibility. It is sometimes said that incentive fees will lead to undesirable volatility in the revenue of management firms. Meyer felt that a large part of the incentive fee probably goes to individuals within the firm, so that the firm itself is not as subject to swings in fee income as one might have thought. Finally, one criticism of incentive fees focuses on difficulties in performance measurement. Very precise measures are necessary since fees depend upon very small differences in rates of return. Meyer conceded that performance measurement can be especially tricky in the fixed income area.

A number of questions were asked by participants. One was why the Foundation settles fees annually, rather than over a three- to four-year period. Meyer answered that if a long time period is chosen, the result may be an asymmetric fee. He said it may be very difficult to terminate a manager and claim a large refund of fees, following a poor performance record. The likelihood is that the client will forgive the penalty. He said also it is important to keep the manager in the game, and he did not want a three- or four-year accumulation of bad performance and fee penalties.

Another question was whether the fulcrum fee is likely to lead to higher or lower fees. Meyer thought that for the Rockefeller Foundation it probably leads to higher fees, because the Foundation believes it has superior managers. For managers in general, he thought it would reduce fees by 30 percent to 40 percent. He was also asked whether the Foundation would hire an equity or bond manager who would not accept incentive fees. His answer was probably not. Finally, he was asked whether it would be appropriate to apply the fulcrum fee concept to pension fund officers, and he answered yes.

Meyer closed his presentation by discussing incentive fee structures that are skewed. The venture capital type of fee provides a base fee and a percentage of returns, for example a base fee of 0.30 percent of assets and an incentive fee of 5 percent of returns. He felt this structure is not fair to the client, since the manager is well paid for capital market movement. He thought this structure also leads to excessive risk, and probably increases the total fee paid.

Lawrence E. Davanzo, Senior Vice President, Wilshire Associates, presented a paper by himself and Stephen L. Nesbitt entitled Performance Fees for Investment Management. He began by saying that he prefers the term "performance fees" to the term "incentive fees". His point was that he sees these fee structures as not necessarily designed to provide an incentive to managers, who will generally say that they are already highly enough motivated, but to reward managers for value added.

Wilshire has accumulated some experience in designing incentive fee structures for both equity and bond portfolios. The choice of an appropriate benchmark is very important, and Wilshire is gaining experience here. The paper contained some comparisons of a number of benchmark indices, and it is clear that substantially different incentive fees may be payable to equity managers depending upon the choice of index.

Most of the fee structures designed by Wilshire have been fulcrum fee structures, and most of them are symmetrical. However, a number of managers are willing to accept fee structures that are asymmetrical in the sponsor's favor. The reason for this appears to be that managers are optimistic about their future performance, and believe that they can produce a 2 percent excess return over an index, with a relatively high probability of doing even better.

For all but one client, the structures designed by Wilshire have covered a three-year rolling time period. In each of the first three quarters a base fee of 2.5 basis points will be paid (10 basis points per year), and in the fourth through twelfth quarter, the bonus will be paid if applicable.

Davanzo presented the results of a number of simulations testing fee structures against a variety of targets, performances, and measurement periods.

Andrew Rudd, Managing Director, Barra, presented a paper entitled Incentive Fees. He began with the question what should incentive fees accomplish? And suggested a number of answers. Plan sponsors think that incentive fees will lower the total fees paid. Some sponsors also want to reward value added and not simply market movements. The willingness of managers to accept incentive fees inspires some confidence on the part of sponsors. A second question raised by Rudd was whether managers
are able to bear the downside risk in incentive fees. Some may not have sufficient capital, but sponsors might buy or capitalize managers.

Rudd discussed some simple incentive fee structures, and then went on to the use of floors and caps. Simulations indicated the effects of floors and caps as well as the effects of shifting emphasis back and forth between base fees and incentive fees. The floor and cap did not seem to make very much difference to the expected fee paid or to the standard deviation in the distribution of fees that might be paid.

Rudd considered the option valuation of incentive fees, and the gaming possibilities that had been raised by Mark Kritzman. Decomposing the excess return achieved by the manager into a systematic and residual portion indicated another gaming opportunity, where the manager increases the beta on the excess return. This raised the possibility of an incentive fee based in part upon this beta.

In closing, Rudd suggested a "tailored" fee, based upon a quadratic function, that rewards a manager for not only achieving a high excess return but accurately predicting that excess. Managers are encouraged to make accurate (as opposed to optimistic) forecasts, and the sponsor is able to directly influence the aggressiveness of the manager.

A number of questions were asked of the panel. One concerned the use of risk adjusted returns. Meyer responded that there is not enough agreement on how to risk adjust. One question concerned the relative importance of a floor and a cap, and Meyer replied that if there is a floor and not a cap, managers are likely to take excessive risks. A suggestion was made that for a manager whose performance record is likely to show long periods of modest returns with a few extraordinarily high spikes, then perhaps the manager should be free of a cap. Davanzo suggested that the use of a long measurement period may take care of this case. One participant suggested that for specialized managers it is particularly important to have specialized benchmarks.
LEVERAGED BUYOUTS

40. INTRODUCTION TO THE TOPIC (Fall, 1989)

Robert E. Shultz, Vice President, RJR Nabisco, introduced a series of papers on consequences of leveraged buyouts. He said he himself was unconvinced with respect to the overall good and bad consequences of buyouts. On the one hand, he was aware of the substantial body of academic research indicating that buyouts generally have beneficial results. But from a first-hand view of the RJR Nabisco buyout, he had to wonder about these conclusions.

His task was to set the stage for the papers to be presented, to express the views of the plan sponsor, and to comment on what is going on in Washington. The papers to be presented by Bill Long, Steve Kaplan, and Rich Ruback, would give the academic view. Mark Mitchell would give the Washington view, and Jack Treynor and Larry Speidell would give the money manager view. On Tuesday afternoon and Wednesday morning the discussion would turn to high yield bonds, and the ability to leverage corporate assets.

Shultz said he thought the RJR Nabisco takeover might signal the high water mark in corporate takeovers. It had certainly produced a strong reaction within Congress, where nine committees had undertaken to investigate this transaction. For the first half of 1989, the number of takeovers and the dollar value had declined somewhat from the year before. Shultz also observed that the players had changed. Two years ago, he said, financial buyers drove the market, while today corporate buyers (both domestic and foreign) dominate. He also commented that more equity is being used in present day takeovers, citing Northwest Airlines and Ohio Mattress as examples. Finally, he observed that the courts seem to be favoring target companies, and we are not seeing the rapid takeovers we saw a few years ago.

Shultz presented his own theory as to what has driven the high volume of corporate restructuring up at least until early 1989. The period from about 1976-1982 was characterized by high interest rates and high inflation. Wide discrepancies emerged between asset values and stock prices. Then the Reagan era saw taxes reduced and a decline in inflation, leaving real interest rates artificially high. At the same time, enforcement of anti-trust laws was relaxed. The result was a green light for mergers and acquisitions financed with junk bonds. Michael Milken found that corporations could borrow on asset values rather than on earnings, and could repay indebtedness by selling assets. It seemed possible to manage corporations such as to produce high returns today at the expense of low returns later. And if this could be kept up, then all would prosper.

Today, stock prices are up and real interest rates are down, and the logic of takeovers has changed. Shultz sees corporations concluding that public ownership is no longer a benefit. Cash flow has become more important than earnings. And the incentive to repay debt is a powerful force in inducing efficient and competitive behavior.

Turning to the role of pension funds in takeovers, Shultz said they do not play an important role. Yet a number of attempts are being made within Congress to restrict or control the activities of pension funds, in part as a result of their perceived role. The growing institutional ownership of United States corporations has been a source of concern for some time now. Congress does not yet know how to deal with this phenomenon. And there are interesting contrasts of opinion among corporate leaders themselves.

Shultz closed by saying he would like to see research that would strengthen the position of pension funds. Otherwise, the Washington community may conclude that undesirable aspects of takeovers can be attributed to pension funds.

41. POST-BUYOUT PERFORMANCE RESEARCH: DATA, METHODS AND MODELS (Fall, 1989)

William F. Long, Guest Scholar, the Brookings Institute, distributed a paper entitled Post Buyout Performance Research: Data, Methods and Models. His presentation had to do with the methodology of research on LBO performance, rather than the results of research that has been performed. He organized his presentation under three aspects of the research process: models, statistical methods, and data.
The model is the starting point, since even with good data a bad model will yield poor results, while even with bad data, a good model may yield useful results. A model should reflect the fact that firms involved in LBOs are multi-product firms, and the company performance is the aggregate of the performance in different businesses. It is important that the model deal explicitly with time. Comparing company performances across time requires an explicit model of changes in the environment over time. And this means that modeling the company performance under recession conditions may be critical.

With respect to statistical methods, Long urged that basic statistical presentation rules be followed in describing data used in research. He also argued that heteroskedasticity is generally found in cross-section studies of firm performance, that this phenomenon should be acknowledged and that appropriate adjustment should be made. Finally, since changes over time are generally a part of research on LBO performance, appropriate statistical methods should be used in time series analysis.

With respect to data, Long began with the description of data samples, arguing that the description should be complete enough that the reader of the research could replicate the work. Representativeness of data is particularly important, and the researcher should explicitly relate samples used to the universe from which they come, and should carefully consider sources of lack of representativeness. Measurement quality of data is important, and the researcher should try a variety of ways for measuring variables.

Having discussed methodology, Long turned to a brief review of five papers reporting on LBO performance. These were:


For each of the five, he commented on research methodology, in terms of the points he had previously raised.

Long closed his presentation with a brief preview of research he himself is undertaking with two other authors. The source of data for this research is the Quarterly Financial Report Program conducted by the Bureau of the Census. The data gathered cover several thousand companies engaged in four activities: mining, manufacturing, wholesale, and retail trade. From the merger and acquisition data base compiled by the M&A Journal, some 465 LBOs were identified within the four business activities referred to. Long anticipates identifying all 465 companies in the Quarterly Financial Reports, and being able to trace the performance of these companies as well as the performance of several thousand other companies in the same businesses.

In addition to repeating some of the sorts of analysis that have been performed in research reported to date, Long and his co-authors plan, over the next two to three years, to examine:

Product market performance five or more years after the buyout.

Projected performance in recessions.

Impact on investment in new plant and equipment.

Research and development impact.
Effects on employees, both number and payrolls.

Role of foreign participation.

42. SOURCES OF VALUE IN MANAGEMENT BUY-OUTS
(Fall, 1989)

Steven N. Kaplan, Assistant Professor of Finance at the University of Chicago Graduate School of Business, distributed a paper entitled The Effects of Management Buyouts on Operations and Value. He began his presentation with the question: Since the post-MBO company has essentially the same management and physical assets, how does extra value accrue? That value is added seems clear. Large premiums are paid to purchase the equity in MBOs, and there is some evidence that further premiums are earned following the buyout. The purpose of the research was to explore the sources of value.

The possible sources are gains from improved efficiency, value transfers from employees, possible underpricing of the buyout, reduced taxes, and possible transfer of value from debtholders to stockholders.

The data sample included 76 companies, in buyouts completed between 1980 and 1990. In each case the newly private firm was an independent entity, not a subsidiary of another private company; at least one member of the original management team obtained an equity interest in the newly private firm; the total transaction value exceeded $50 million; and the Wall Street Journal contained an announcement that the company proposed to go private. Post-buyout information was available for 48 of the 76 MBOs. Twenty-eight of these companies filed 10-Ks with the SEC because they had publicly held debt or preferred stock outstanding before the buyout. The 76 sample buyout companies had a median equity market value of $254 million at the time of the buyout. The median premium to shareholders at the time of the buyout was 42.3%. The buyouts resulted in large increases in debt levels, from a median ratio of debt to total capital of 18.8% to a median ratio of 88.4%.

The research examined changes in three cash flow variables: operating income (before depreciation), capital expenditures, and net operating cash flow. Over a three year period following each buyout, Kaplan examined changes in the level of each of these three cash flows as well as changes in the ratio of operating income to assets and the ratio of operating income to sales. The latter two ratios would allow for asset sales that could affect the absolute level of operating income.

In answer to a question about R&D expenditures, Kaplan replied that of the 76 companies only seven had R&D expenditures exceeding 1% of sales. So he had no basis for drawing any conclusions with respect to the impact on R&D of management buyouts.

With respect to the possibility that the value created in an MBO derives from a loss to employees, Kaplan concluded that there was little evidence of this. For the 42 buyouts for which employment data were available, there was little change in the level of employment. It was, however, down 12% relative to industry data, suggesting slower employment growth, but not a net loss of jobs.

In concluding that the value in MBOs was not the result of underpricing the original buyout, Kaplan cited a number of tests. The projections made in the course of the MBOs proved to have been overly optimistic, suggesting that the buyers did not use inside information in order to purchase cheaply. In addition, the behavior of management in participating in the MBOs tended to contradict the proposition that insiders had taken advantage of others.

With respect to the possibility that tax benefits contributed substantially to the value of MBOs, Kaplan concluded that the value of the added interest deductions could account for the entire value added, or for only a small fraction, depending upon the effective tax rate on interest deductions and the life of the new high debt load. The value of the tax deductions from a step-up in asset basis (something possible until the tax legislation of 1986) was much smaller.

Finally, Kaplan had not performed any independent research on a possible value transfer from debtholders to equity holders, relying on the work of others to conclude that no significant part of the value added comes from bondholders.

With respect to operating income results over the three years following the MBO, Kaplan reported that the level of operating income was generally flat, but that operating income as a
percent of sales was up 20% and as a percent of assets up 20% (in all cases relative to operating income of non-MBO companies). Capital expenditures, again relative to non-MBO companies, were down 35-60%, and down 10-20% as a percent of sales and a percent of assets. Relative cash flow was up 50%, while as a percent of sales it was up 60% and as a percent of assets it was up 50%. The conclusion seemed to be that following the MBO, there had been a significant reduction in capital expenditures (in many cases including asset sales), and a significant increase in the efficiency with which assets were used.

Kaplan also presented results on returns to investors in MBOs. For 25 companies a market value could be determined for some date after the buyout. For these companies, the market adjusted or excess return to stockholders from two months before the MBO proposal to completion of the MBO had a median of 37.2%. The market adjusted or excess return earned by post-buyout investors (from completion of the MBO until a subsequent sale of the company) showed a median of 28.0%. The total market adjusted return showed a median of 77.0%.

Having shown what the contribution of tax reductions might have been to these rates of return, Kaplan discussed the net cost or benefit to the United States Treasury in MBOs. His conclusion was that in cases where operating income improved the Treasury would show a net gain, but otherwise the Treasury would experience a net loss. He had traced through the figures for the RJR Nabisco case, to conclude that the Treasury had been a net gainer.

In concluding his presentation, Kaplan said that his research was supportive of the hypothesis that management buyouts experience post-buyout operating improvements and value increases, and that these appear to be generated by improved incentives rather than transfers from employees or superior managerial information.

43. LESSONS FROM THE RJR NABISCO LBO (Fall, 1989)

Richard S. Ruback, Associate Professor of Business Administration at the Harvard Business School, suggested that there are four lessons to be learned from this particular takeover. The first is that the takeover market is highly competitive. The second is that takeover premiums are based upon reasonably expected cash flows, and do not reflect overenthusiastic bidding influenced by factors other than value. Third, the strategic focus of a takeover is on the extraction of cash. That is, values are based upon opportunities to extract cash from the target company. And fourth, auctions lead to negotiations. That is, what may appear to be a simple and straightforward strategy of holding an auction and awarding the company to the highest bidder turns into a much more complicated series of negotiations.

The rapid escalation of bids in the RJR Nabisco case, from the management group bid of $75 a share on October 19, 1988, to the KKR bid of $90 on October 24, to the new management bid of $92 on November 3, to the formal auction that drew other bidders into the contest, and to the ultimate victory of KKR at $109, supported the proposition that there was plenty of competition, to the benefit of the RJR Nabisco shareholders. The benefit to these shareholders was significantly enhanced by the decision of the company's board of directors to offer to all bidders who agreed to a standstill agreement full access to all corporate information. This brought all of the outside bidders up to the information level of the management group.

Ruback had undertaken to construct the cash flows the bidders might have been expected to have projected for themselves. A variety of information sources was available. The management itself had made some projections. A great many analysts following RJR Nabisco stock had published projections. And filings with the Securities and Exchange Commission provided further data. Ruback had identified the strategies that were available to the management of RJR Nabisco, estimated the cash flows for those strategies, estimated discount rates and discounted the cash flows to present values.

He discussed the process of discounting. One approach is to value the equity cash flows at an equity discount rate. Ruback had followed a second approach; to value the cash flows available to all suppliers of capital and then to subtract the value of claims other than those of the common shareholders, to arrive at the value of the common shareholder claim. Ruback had concluded that an appropriate discount rate; before taxes, was 14.6%, representing a 9% riskless rate plus an 8% risk premium multiplied by an asset beta of .70. On this basis he valued three strategies:
the strategy the company was pursuing before the takeover, the strategy anticipated by the management group should its bid be successful, and the strategy anticipated by KKR should it succeed in buying the company. The per share values for the three strategies were $71, $110, and $106. The $71 figure was fairly close to the first management bid of $75. The difference between the $71 value and the $110 value came from the management proposal to sell off the food product parts of RJR Nabisco. There was some discussion of how this increase in value could come about. One possibility was that the buyers of the food product operations could be expected to pay more than those operations were worth. Ruback thought it more likely that the buyers anticipated operating the food product business much more profitably.

Having established that the cash flow projections led to stock values very close to the bids of the management group and KKR, and ultimately very close to the winning bid, Ruback turned to his third lesson, which was that the strategies of the bidders focused on the extraction of cash from the company. He identified four sources of cash and attached a value to each, as shown in the following table.

<table>
<thead>
<tr>
<th>Source of Cash</th>
<th>Amount in RJR Nabisco Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sell off unneeded assets</td>
<td>$22 billion</td>
</tr>
<tr>
<td>Reduce investment in capital projects</td>
<td>$11 billion</td>
</tr>
<tr>
<td>Improve operations</td>
<td>-$1 billion</td>
</tr>
<tr>
<td>Reduce income taxes</td>
<td>$8 billion</td>
</tr>
<tr>
<td>Transfer value from bondholders</td>
<td>$0</td>
</tr>
<tr>
<td>Total</td>
<td>$40 billion</td>
</tr>
</tbody>
</table>

What is particularly interesting from the preceding table is that $33 billion could be raised by the sale of assets and reduction in capital investment, with only a $1 billion reduction in operating income. This appeared to be the real key to the premium paid in the takeover. Some value was to be added through reduced taxes largely as a result of increased leverage.

In discussing his fourth lesson, to the effect that auctions only lead to negotiations, Ruback described the consequences of the auction held by the board of directors. On November 18, three bids were received. The management group bid $100 a share, KKR bid $94; and First Boston bid a range of $105-$118. The strategy followed by the board of directors was to announce these bids and then to hold a second auction on November 29. On that day the management group bid $101; KKR bid $106; and First Boston bid a range of $103-$115. The special committee of the board began to negotiate an agreement with KKR, but then the management group informed the special committee that it wanted to present still another bid. On November 30 both KKR and the management group revised their bids with the total management bid still $101 and the total KKR bid still $106. The special committee decided to consider new bids from both parties, and that afternoon the management group revised its bid to $108 and then to $112, while the KKR bid was revised to $108. Still later in the day, KKR revised its bid to $109. When the advisor to the special committee evaluated the management group bid and the KKR bid, it concluded that the values of the bids were substantially equivalent. The special committee recommended to the board of directors acceptance of the KKR bid because KKR offered better treatment for terminated employees and divestment of fewer parts of the corporation.

The point of the lengthy story of the bidding process was that the special committee of the board of directors was able to extract greater value for the shareholders than might have been obtained by means of a simple auction and award of the company to the highest bidder at that auction.

44. DO BAD BIDDERS BECOME GOOD TARGETS? (Fall, 1989)

Mark L. Mitchell, Research Scholar, The Securities and Exchange Commission, distributed a paper by himself and Kenneth Lehn entitled Do Bad Bidders Become Good Targets?. He began his presentation by commenting that a number of studies have shown that shareholders of target companies generally do quite well in buyouts because of the premium paid for their shares. This raises the question where the gains have come from. Some argue that wealth has not been created but simply transferred. Mitchell’s conclusion, however, was that the evidence seems to favor a wealth increase rather than simply a transfer.
A study of the stock price performance of companies that take over other companies suggested that the shareholders of the acquirers do not benefit much in takeovers. Indeed, the stock prices seem to fall more often than they rise. This motivated Mitchell to investigate which acquirers win and which lose in a takeover.

He had begun by looking at Goodyear Tire and Rubber Company. In 1983, Goodyear decided to diversify from tire manufacturing into energy, and in that year it purchased Celenor Oil, for $800 million. On the day the acquisition was announced, Goodyear’s stock price dropped 10%, or about $250 million. Over a slightly wider event window, from five trading days before the announcement through one trading day after the announcement, the stock price actually declined almost 15%, resulting in a shareholder loss of $359 million. In 1986, James Goldsmith made a bid for Goodyear, promising to sell off Goodyear’s petroleum assets. It appeared that the premium offered by Goldsmith would have recouped for the Goodyear shareholders a large part of the loss they had suffered three years earlier. In fact, Goodyear undertook on its own the sales proposed by Goldsmith, borrowed money, and paid off Goldsmith.

To see whether the Goldsmith case was an example of a large class of poor acquisition decisions (in the judgment of the stock market) followed by takeovers or restructurings, Mitchell had assembled a database to include stock price reactions to acquisitions made during the period 1982-1986. The question to be answered was whether companies that had made bad acquisitions became attractive takeover targets.

Out of the companies reported on by Value Line during the 1982-1986 period, 401 acquisitions were made by 280 firms. These included 232 acquisitions by 166 non-targets (firms that did not become takeover targets). Another 113 acquisitions were made by 77 targets (companies that ultimately did become takeover targets). The second category breaks down further to 70 acquisitions by 48 hostile targets (targets of hostile takeovers), and 43 acquisitions by 29 friendly targets (targets in friendly takeovers). Finally, 56 acquisitions were made by 38 miscellaneous firms, that did not become takeover targets but did undertake restructurings or went bankrupt.

Mitchell first reported on the abnormal stock market performance associated with the acquisitions. He had tabulated the abnormal stock market performance on the day the acquisition was announced on the broad tape, and over four longer time periods, ranging from the day before the announcement to the day after, up to 20 days before the announcement to 40 days after. For the entire sample of 401 acquisitions, the impact on the stock price was very small. For the non-targets, however, it was larger and significant while for the target companies it was negative and significant. The stock market seemed to have clearly distinguished between the good acquisitions by companies that did not later become targets and the poor acquisitions by companies that ultimately did become targets. And the stock market also reacted more strongly to the bad acquisitions of the companies that became hostile targets than to the bad acquisitions of the companies that became friendly targets.

These results suggested that the stock market reaction to an acquisition may be a predictor of the likelihood of the acquirer becoming itself a target. Mitchell suggested a number of names that can be identified by such negative stock market reactions to acquisitions. These included Allied Signal, Champion International, Dun & Bradstreet, General Dynamics, and Schering Plough.

Mitchell suggested two explanations for the negative stock market reaction to acquisitions. The price paid for the acquisition might be too high, or negative synergy might be anticipated. In the latter case, we should see evidence of the acquisitions being divested. And indeed subsequent divestments are much higher for target companies than for non-target companies. About 40% of the acquisitions made by target companies were divested, while only 9% of the acquisitions of non-target companies were divested. It turns out that the stock market reaction to an acquisition provides a good predictor of whether the acquisition will ultimately be divested. The statistics so far support the proposition that the market is efficient, that poor acquisitions are likely to lead to divestments, and that takeovers are motivated by the attractions of these divestments.

He had gone on to investigate the relationship between management ownership and quality of acquisition. He found that the larger the degree of management ownership in a corporation, the greater the likelihood that acquisitions by that corporation would be judged favorably by the stock market. He also
investigated the relationship between leverage and quality of acquisition. He found that companies that are highly leveraged tend to make better acquisitions than companies with lower leverage. This conclusion led to a discussion of the possible impact of congressional limitations, by way of disallowed interest deductions or other devices, to restrict takeovers. Mitchell discussed the apparent impact on the stock market of a number of congressional proposals, indicating that the market has reacted negatively to indications that takeovers might be restricted, and positively to indications that proposals for restrictions have been withdrawn.

Mitchell's conclusion was that his research supported the proposition that one motive for corporate takeovers is to discipline managers who operate their firms in ways that do not maximize profits. More specifically, it supports the proposition that takeovers discipline managers who use free cash flow to make poor acquisitions. The research also supported the argument that hostile bust-up takeovers often promote economic efficiency by reallocating target assets to higher valued uses.

45. THE VALUE OF CONTROL
(Fall, 1989)

Jack Treynor, President of Treynor Capital Management, Inc. distributed a brief paper entitled The Value of Control. He began his presentation with some quotations from Berle and Means, published more than 50 years ago, on the separation of ownership and management in the modern corporation. They had concluded that management could legally use its control to divert corporate value to itself, although they were not willing to predict that managements would take advantage of this privilege.

Treynor's observation was that managements have taken advantage of the privilege and he commented that Jensen and Meckling, in their 1976 paper on agency, discuss the rewards to management and argue that the cost of these rewards is fully discounted by shareholders. The result of this discounting is "price protection", which insures that shareholders pay a fair price for the benefits they will receive net of rewards diverted to management. Treynor suggested that in a hostile takeover what is happening is that the new owners are purchasing the value of control (that is, the value of the management's ability to extract a rent for their control position) plus the residual value enjoyed by the shareholders. The takeover premium is presumably the amount being paid for the value of control, and Treynor estimated that takeover premiums in hostile takeovers are averaging around 40% of pre-takeover market value. His question was what fraction of the total value of the corporation is being diverted to those in control in order to justify a 40% premium.

If we designate the total value of the corporation at time t, as V(t), absent any disbursements made by the corporation, then V(0) is the known value at the present time. If a dividend is paid at a yield p, then the value remaining after the dividend at the present time is (1-p)V(0). At time point 1 the value will be (1-p)V(1). The dividend at this time point 1 will be p(1-p)V(1), leaving (1-p)^2 V(1) which at time point 2 will be worth (1-p)^2 V(2).

We can value the stream of dividends to infinity, and they come to the present value of the corporation V(0).

Now we decompose the dividend yield p into three yields. First, there is a stream of dividends to the shareholder, and we designate the dividend yield to the shareholders as p1. Second, there is a stream of "dividends" to the United States Treasury, in the form of income taxes, and we designate this dividend yield as p2. Finally, there is a stream of "dividends" to the management, the yield here being designated p3. It is important to note that the yield p3 represents benefits the management is able to extract from the corporation in addition to the fair market value of its services. It is in fact a rent enjoyed by the management by virtue of its control position.

For convenience, Treynor assumed that p1, p2, and p3 are constant over time. The assumption may be somewhat unrealistic, but it does not detract from the overall value of the model to be derived.

A little algebra leads to the conclusion that

\[
V_1 = \frac{V}{\frac{p_3}{p_1} + \frac{1}{1-T}}
\]
where $V_1$ is the value of the shareholders claim, $V$ is the total value of the corporation, and $T$ is the corporate tax rate.

Now, in a takeover the takeover management (the new management) will get control of the target firm and therefore the value of the control. The takeover shareholder, however, pays for the takeover. What the takeover shareholder gets is the gross value of the target firm less the value of control to the takeover management. That is: the pre-takeover price + the value of target management control – the value of takeover management control. What the shareholder pays is the takeover price, which is the pre-takeover price + the takeover premium. The net gain to the takeover shareholder is then:

the pre-takeover price + the value of the target management control – the value of the takeover management control – the takeover price.

This equals the value of the target management control – the value of the takeover management control – the takeover premium.

Assuming the takeover is to result in some gain to the takeover shareholder, the value of the target management control must be at least as large as the takeover premium. Otherwise, the takeover shareholder must lose even if the takeover management extracts no value from its control. But the takeover management will surely extract some value for its control; otherwise it would have no motive for the takeover. So the value of the target management control must be large enough to cover the takeover premium and to give some value to the takeover management control. We had an expression for the value of the shareholders’ claim before the takeover. We can write an expression for the value of the shareholders’ claim after the takeover, using asterisks to designate the new dividend yield for control -- the yield to be paid to the takeover management, and the new yield to shareholders. The new value for the shareholders’ claim is:

$$V_1^* = \frac{V}{p_3^* + \frac{1}{p_1^* + \frac{1}{1-T}}}$$

In the expression above, we are assuming that the gross value of the corporation does not change as a result of the takeover.

The premium paid by the takeover shareholder, expressed as a fraction of the takeover price, turns out to be:

$$\left(\frac{p_3}{p_1} - \frac{p_3^*}{p_1^*}\right) \left(\frac{p_3^*}{p_1^*} + \frac{1}{1-T}\right)$$

If observed takeover premiums are averaging about 40%, and if the effective corporate income tax rate (including state as well as federal taxes) is 40%, then:

$$\frac{p_3^*}{p_1^*} = \frac{5}{7} \left(\frac{p_3}{p_1} - \frac{2}{3}\right)$$

The implication of the expression above is rather interesting. It says that when the ratio $p_3/p_1$ is less than 2/3, then $p_3^*/p_1^*$ is negative. This means that either the takeover management accepts a negative yield for its control (which no takeover management will be prepared to accept) or the takeover shareholders suffer a net loss. Put another way, so long as the target management keeps its ratio of control yield below 2/3, it should be safe from a takeover. On the other hand, since takeovers are actually occurring at 40% premiums, Treynor concluded that the ratio of control yield to shareholder yield actually exceeds 2/3 in a good many companies.

In a leveraged buyout, where the takeover management and the takeover shareholders are the same, then it is feasible for the ratio $p_3^*/p_1^*$ to go to zero. The takeover management/shareholders are buying out the value owned by the original shareholders plus the value of control. Having gained both of these values, they can operate the company for a while and then resell it in an IPO. Treynor’s argument is that in this IPO the price will not be the discounted price suggested by Jensen and Meckling -- discounted to allow for the value of control -- but will be the full value of the corporation, that is the value to the stockholders plus the value of control. Following the IPO, the management will exact its rent for control, and the value to the new shareholders will be only the residual value, somewhat less than the price they paid in the IPO. And so the process can go on, leveraged buyout followed by IPO, followed by leveraged buyout.
MARKET TIMING

46. THE CASE FOR TACTICAL ASSET ALLOCATION (Fall, 1988)

Richard A. Crowell, Senior Vice President, and Edgar E. Peters, Vice President, The Boston Company, distributed a paper entitled The Case for Tactical Asset Allocation. Crowell began the presentation with the observation that asset allocation is easily the most important investment decision, and that asset allocation decisions can consistently add value to investment portfolios. Tactical asset allocation is essentially contrarian -- it exploits the fact that the market frequently reflects excessive optimism or excessive pessimism. While history confirms that stocks can be expected to achieve higher returns than bonds and bonds can be expected to achieve higher returns than cash, successful switching among the three asset classes can achieve higher returns than stocks alone. Over the ten years 1978 through 1987, stocks outperformed both bonds and cash in only five years; bonds came first in two years, and cash was first in three years.

There are a number of practitioners of tactical asset allocation. Methodologies differ, as do the asset classes employed. Describing the Boston Company methodology, Crowell said the market consensus of cash returns is estimated by a simple arithmetic average of the yields on three, six, and twelve-month treasury bills. The market consensus return for bonds is estimated as the arithmetic average of the yields to maturity of a sample of long U.S. government bonds. The expected return on stocks is estimated by a three-stage dividend discount model, applied to the earnings and dividend projections of the Boston Company Investment Research Department. An alternative is the use of a normalized earnings yield.

The equity premium is the expected return on stocks less the expected return on bonds, and has historically been about 4.5%. If the current premium is less than 4.5%, stocks are unattractive compared to bonds, and if it is greater than 4.5%, stocks are attractive. The bond premium is the excess expected return of bonds over cash reserves, and historically has averaged about 1% to 1.1%.

Economic data are also useful in making tactical asset allocation decisions. Crowell displayed a table indicating the value added in the allocation process by a variety of economic indicators.

He continued with a comparison of trading methods and implementation methods, and provided a table of various providers of tactical asset allocation, together with the number of clients for each, the number of asset classes used, and the methods of valuation, allocation and implementation.

He concluded with performance data supporting the effectiveness of tactical asset allocation, and argued that as the popularity of this investment device increases, the value added will gradually deteriorate.

Edgar Peters continued the presentation, reporting on empirical work supporting the proposition that capital markets are efficient in the long term and inefficient in the short term, to provide a theoretical justification for tactical asset allocation.

Peters began by describing the discovery of various natural phenomena that could be characterized as representing a biased random process, or "fractional Brownian motion", as opposed to a pure random process. A method of analysis to deal with these processes is "rescaled range analysis" or R/S analysis. The methodology has been applied by Mandelbrot to economic data, and Peters applied it to stock and bond returns.

Fractional Brownian motion means that there is long-term dependence, or a memory, between observations. The events of one period influence all of the periods which follow, and this dependence is labeled persistence. In the bond market, 21.5% of bond returns are influenced by the past. In the stock market, 16.8% of stock returns are influenced by previous activity. For relative stock/bond returns, the number is 26.9%. Peters believes that this time dependence reflects the influence of market sentiment. While the efficient market hypothesis postulates that all available information is reflected immediately in capital market prices, persistence theory says that the influence of information ripples forward in time. Peters' research showed the persistence effect in increments as small as six months and as long as 38 years.
To apply R/S analysis, we calculate an average return over a number of months, and then we calculate the accumulated departure from the average over N of those months. We take the difference between the maximum and minimum cumulative deviations over N periods, and divide it by the standard deviation of the observations. The ratio of this range to the standard deviation can be represented as follows:

$$\frac{R}{S} = \frac{N}{2}^H$$

For pure Brownian motion, the value of H is .5. For other types of distributions, H can range between 0 and 1. If H is greater than .5 but less than or equal to 1, we have persistent behavior. This means that if the trend has been positive in the last observed period, the chances are that it will continue to be positive in the next period. If H lies between 0 and .5, we have anti-persistent behavior. This means that if the trend has been positive in the last period, the chances are high that it will be negative in the next period.

Working with monthly data for 38 years from 1950 through 1988, Peters found H values of .61 for the S and P 500, .64 for treasury bonds, and .66 for stock/bond relative returns. The memory effect in the stock/bond relative returns offers promise that we can forecast these returns. A graphical analysis demonstrated that for stocks and bonds alone, the memory effect persists for at least 38 years. But for the stock/bond relative returns, the effect seems to last no longer than about six years.

Peters drew three conclusions from his work. First, capital markets demonstrate a biased random walk. Second, the bias is caused by a memory effect or persistence of the influence of information. Third, relative stock/bond returns exhibit strong persistence which appears to dissipate after about six years.

47. THE CASE AGAINST TACTICAL ASSET ALLOCATION
(Fall, 1988)

Kenneth French, Professor of Finance, Graduate School of Business, University of Chicago, distributed a paper entitled Forecasting Returns on Corporate Bonds and Common Stocks by himself and Eugene F. Fama. He explained that the published title of his presentation might be misleading. He and his colleague had identified strong predictability of one- to four-year stock returns and bond returns, which might or might not indicate value in allocation.

A discovery that stock and bond rates of return are predictable may be surprising to those familiar with early work demonstrating a lack of autocorrelation in stock prices, and a conclusion that returns could not be forecasted. French provided an explanation for the newer findings. Expected rates of return are linked to business cycles, and tend to be high at the bottom of a cycle and low at the top. This explanation leads to the conclusion that when high stock returns are anticipated, probably high bond returns will be anticipated at the same time.

The research reported by French made use of four classes of securities: treasury bills, AAA corporate bonds, unrated bonds, and common stocks (value weighted and equally weighted). For common stocks, the dividend yield was used to forecast future rates of return. For bonds, two measures were used for forecasting. One was the term premium, that is the difference between the yield on long bonds and the yield on short bonds. The other was the default spread, which is the yield to maturity on all bonds less the yield to maturity on AAA bonds.

For common stocks, dividend yields were used to predict stock returns for horizons of one month, one quarter, and one, two, three and four years. Forecasts for four year horizons were the most accurate. Adding the term spread variable to the dividend yield, improved the forecasting power.

For bond returns, the default spread worked best for low-grade bonds, and dividend yield showed some power to forecast low-grade bond returns. Dividend yield, however, did not add any explanatory power to the default spread.

French pointed out that the regression relationships were rather stable over 60 years from 1927 through 1986. He had examined separately the period 1941 through 1986 because of changes in volatility over time, but the sub-period showed essentially the same relationships as the entire period.

An interesting discovery was that while the predictive power of the model for stock returns and returns on low-grade bonds increased with the return horizon, up to four years, for higher grade bonds the best predictability seemed to be achieved at about
one year, and then fell for longer return horizons. French provided an explanation. Forecasts for very short periods are dominated by noise, while forecasts for very long periods incorporate a reversion to the average. As dividend yields revert to their mean, with return horizons beyond four years or so we do not get improvement in forecasting power. For high grade bonds, there appears to be a more rapid reversion to the mean.

French reported the results of some trading rules based upon switching between treasury bills and AAA bonds, and among treasury bills, AAA bonds, low-grade bonds, and the value weighted stock market. He assumed no transaction costs and his trading rule was simple: rely on one month return forecasts to pick the best asset. The two-asset strategy led to an improvement in return of 1.86% annualized, over the return on AAA bonds. And there was some reduction in standard deviation. The four-asset strategy led to an improvement in rate of return of 1.05% annualized over returns on common stocks. And again there was some reduction in standard deviation. The t statistic on the improvement, however, was only .94. In the two-asset model, it had been 2.98.

In concluding, French said that we are able to predict long-term stock and bond returns, and we think we understand what it is about the capital markets that makes this prediction possible. We also think we understand why we cannot predict returns over very long time periods. We think we know why stock and bond rate of return expectations tend to move together and how they relate to the business cycle. In a later panel discussion he added the comment that his results were consistent with efficient markets.

48. ASSET ALLOCATION: THE LONG TERM VIEW (Fall, 1988)

Martin L. Leibowitz, Managing Director, Salomon Brothers Inc., distributed a Salomon Brothers publication by himself and William S. Krasker, entitled The Persistence of Risk: Shortfall Probabilities over the Long Term.

He described his research as starting from the familiar proposition that over the long term stocks can be counted on to deliver a higher rate of return than bonds, while over the short term stocks show a higher volatility. The lesson would appear to be that those who are willing to put up with short term volatility should be invested 100% in common stocks. Leibowitz, however, had pursued the probability of stocks underperforming bonds to see just how rapidly it does decline over time. This shortfall probability based on some fairly standard assumptions, is 44% at the end of one year, 34% at the end of five years, and 25% at the end of 20 years. His belief was that most investors would be surprised at the magnitude of these probabilities. Over time horizons that most people would consider rather long, there are substantial likelihoods that bonds will outperform stocks.

The model used in Leibowitz' work assumed a lognormal distribution for the value of an equity portfolio, with an expected return of 13% and a standard deviation of the logarithmic return of 18%. The bond portfolio had an expected return of 9% and a logarithmic volatility of 10%, corresponding approximately to a portfolio with a six-year duration.

The work was extended to establish shortfall probabilities for specified stock and bond mixes. For high ratios of stocks to bonds, the probability of shortfall rises surprisingly quickly over time. That is, the likelihood of a shortfall at the end of five years is very much greater than the likelihood of a shortfall at the end of one year. Equally surprising, to Leibowitz, is how long it takes at a high ratio of stocks to bonds, to reach a low probability level.

Having established the high probability, and the persistence of high probability of a shortfall in stock returns, Leibowitz turned the discussion over to Terence C. Langetieg, Vice President, Salomon Brothers Inc., to discuss simulations of stock and bond rates of return. Langetieg described a simulation process that assumes random movement of interest rates, but with a mean reversion built in. Interest rates were then forecasted to have a mean of 9% with a 15% reversion. The bond portfolio was assumed to have a duration of 4.5, so that the return on bonds would be predicted as the yield less 4.5 times the change in yield from the last period. Stock returns were simulated to average 4% above the bond yield. An inflation element was added, assuming a mean and standard deviation.

Leibowitz presented a variety of nominal and real simulation results. Most of the lessons of the earlier work were reinforced. The benefits to a mix of stocks and bonds appeared more clearly, especially if the focus is on the likelihood
of unusually poor investment results. While stocks clearly offer higher expected returns, the riskiness persists through time, probably to a greater extent than most investors realize.

49. Panel Discussion - TACTICAL ASSET ALLOCATION (Fall, 1988)

Martin Leibowitz, Managing Director, Salomon Brothers Inc., introduced a panel consisting of Gary Brinson, Vice President, First Chicago Investment Advisors, Richard Crowell, Senior Vice President, The Boston Company, Charles DuBois, Vice President, Chancellor Capital Management, Inc., Kenneth French, Professor of Finance, Graduate School of Business, University of Chicago, Robert D. Arnott, President and Chief Investment Officer, First Quadrant, and William F. Sharpe, President, Sharpe-Tint, Inc.

Brinson began the discussion, focusing on the process of asset allocation, and the importance of meeting the particular goals and preferences of a client. The starting point then is identifying the goals and preferences and establishing a normal portfolio to meet them. This is the portfolio that suits the client under normal conditions, and we can characterize the classes of assets that make up this portfolio in terms of their normal expected returns, standard deviations, and correlations. Brinson observed that we have to be careful about defining asset classes, and that historical data are not generally a good basis for determining the normal characteristics of asset classes.

From the normal portfolio, we move to allocation when the characteristics of individual asset classes change enough to call for an alteration from the normal portfolio.

The judgments behind tactical asset allocation do not require price forecasts. It is better to think in terms of cash flows, and adapt the portfolio to take advantage of these flows. This was in keeping with some remarks earlier in the seminar by Keith Ambachtsheer.

In describing for his firm the normal, and the current allocation of portfolio assets, he commented that the normal allocation to domestic large cap stocks is 28%, while the current allocation is 23%. The normal for small cap stocks is 12%, while the current allocation is 11%. For dollar denominated bonds, the normal is 20%, and the current allocation is 27%. Were interest rates to move by one percentage point, he did not think the effect would be large enough to cause a change in the current allocations.

DuBois commented on asset allocation at Chancellor Capital Management. Since January 1981, the firm has been making real time forecasts and since mid-1982 has been managing money using asset allocation.

He said his firm's practice was somewhat similar to that of the Boston Company, described in an earlier session by Richard Crowell (see summary #46). Value factors, economic factors, and sentiment factors are all considered. Turnover runs 50% to 60% per year, probably higher than one would find at an asset allocator using strictly value approaches.

Portfolios using only stocks and cash are normally invested 100% in stocks, which is the current allocation. For portfolios using stocks, bonds, and cash, the normal is 65%-35%-0 and the current allocation is 80%-20%-0. A 10% rise in the price of stocks would shift the allocation of the stock/bond/cash portfolio to 75%-25%-0.

If interest rates were to rise 1%, the stock/cash allocation would go to 80%-20%, and the stock/bond/cash portfolio would go to 45%-50%-5%. A downward move of 1% in interest rates would shift the stock/bond/cash portfolio to 95%-5%-0.

There was some surprise at the current heavy emphasis on common stocks, and DuBois explained that this reflected a forecast of no recession for a year or so, monetary factors below normal, but not bad, with sentiment factors optimistic.

Arnott set out an asset allocation scheme, beginning with the policy asset allocation, which is the long run normal allocation that seems to best service the long run needs of the investor. Next come dynamic asset allocation and tactical asset allocation. The former is designed to protect rate of return, and portfolio insurance is an example. The latter tends to take the opposite side of the trade from dynamic allocation and may take one of several forms. One is ad hoc allocation, which Arnott described as a dangerous procedure. Another alternative is passive rebalancing, which will add value in the long run. And a third is active reallocation based upon changing perceptions of expected risks and returns.
The key assumptions behind active tactical asset allocation are that markets provide us with objective indications of available returns, that there are indeed normal expected returns, and that periods of disequilibrium are followed by the restoration of these normals.

The key attributes of a sound tactical asset allocation methodology are: a contrarian attitude, objective measures of expected returns, and a means to translate return expectations into specific reallocations.

He believes the best tactical asset allocation methods combine objective measures of disequilibrium conditions, the evaluation of economic implications, determinations of sentiment patterns, and a mechanism to deal with changing equilibrium conditions.

He observed that First Quadrant in making allocation decisions places a 40% weight on value measures, a 30% weight on macroeconomic measures, and a 30% weight on sentiment measures.

At the present time, for an aggressive portfolio that is free to move from 0 to 100% in stocks, bonds, and cash, the allocation is entirely to cash. If stocks were to drop 10%, the allocation would shift to 25% stocks and 25% bonds. If yields were to rise one percentage point, the allocation would move to 25% bonds. And if yields were to drop one percentage point, the allocation would move to 25% stocks.

Sharpe traced a prescription for asset allocation based upon the relation of the risk tolerance of the investor to the risk tolerance of the market or of society as a whole. Considering the choice between investment in risk-free assets, or investment in a risky portfolio, embracing all other assets, Sharpe offered the following proposition.

For the optimal proportion to be held in a risky portfolio:

\[ X = \frac{E - r}{2s^2} \]

Maximize \[ 1 + r + X(E - r) - \frac{X^2 s^2}{t} \]

where \( r = \) risk free rate, \( E = \) expected return on the risky portfolio, \( s = \) standard deviation of returns on the risky portfolio, \( X = \) proportion invested in the risky portfolio, and \( t = \) risk tolerance (zero to one).

Solution is: \[ X = \frac{E - r}{2s^2} \]

For society as a whole, \( X = 1 \), so \[ 1 = \frac{E - r}{2s^2} \]

where \( T \) is the societal risk tolerance.

The market clears when \[ \frac{E - r}{s^2} = \frac{2}{T} \]

We know that risk tolerance rises with wealth, so it seems reasonable that \( T \) should rise as the wealth of all investors rises. Sharpe showed a graph of real security values per capita, over time and explained the result of regressing the 12 month \( (E - r) \) on the wealth statistic for the month prior to the 12 month return period. The relationship turned out to be highly significant, indicating that indeed risk tolerance is related to wealth, for society as a whole. The risk premium appeared to be about 3.5% per 10% of standard deviation since World War II. The premium was as high as 7% following the market decline of 1973 and 1974, became quite low prior to October 1987, has risen since but still remains at a historical low.

Returning to our allocation formula, and observing that the tolerance for risk changes over time, Sharpe made the following observation:

The optimal proportion at time \( i \) is:

\[ X_i = \frac{E_{mi} - r_i}{2s^2_{mi}} t_i \]

and the market clearing condition is

\[ T_i = \frac{2s^2_{mi}}{E_{mi} - r} \], so: \[ X_i = \frac{t_i}{T_i} \]

The message, then, is that as societal risk tolerance moves with wealth, if the investors risk tolerance moves in a similar way, a buy and hold strategy is appropriate. If, on the other hand, the investors risk tolerance remains constant while the risk tolerance of society is changing, then the proportion invested in risky assets should change.
The relationships here are all consistent with an efficient market. So we have an explanation for reallocation of assets from time to time in an efficient market. But that reallocation depends entirely on shifts in the risk tolerance of the investor as it relates to the risk tolerance of society as a whole.

Crowell gave 60% as the normal equity allocation in the Boston Company allocation model, with the current allocation at 22%. The balance of the portfolio is divided equally between bonds and cash. A 10% movement in stocks or a 1% movement in interest rates would each have a 10% impact on the positions of the allocated portfolio.

A number of questions were raised by participants dealing with methodologies in tactical asset allocation and differences among the various models used. Some participants were puzzled that different models could give widely differing signals at the same point in time. Arnott commented that there is plenty of room for differences of opinion with respect to the expected return for stocks, and in establishing the equilibrium points. At market extremes, for example, October 1987, the models probably agreed. The wide variety in the recommendations of different models today may simply reflect the fact that there is currently no strong disequilibrium.

There was considerable discussion of market efficiency and the significance of efficient or inefficient markets to asset allocation. Kenneth French commented that his findings of the predictability of long run stock returns are quite consistent with efficient markets. He reinforced the point made earlier by William Sharpe, commenting that if markets are efficient and if an investor has a risk tolerance that tracks that of the market risk tolerance, then there are no benefits to be gained by tactical asset allocation.

Langetieg, who had spoken earlier during the seminar (see summary #48), observed that tactical asset allocation has real value in identifying risk premiums. Whether or not one acts to reallocate assets, investment managers can make use of these risk premiums, and an increase in tactical asset allocation practitioners may lead to still more information on risk premiums.
PENSION FUNDS

50. OPENING ADDRESS: FASB'S TASKS (Fall, 1988)

James J. Leisenring, Vice Chairman, Financial Accounting Standards Board, delivered the opening address at the Fall, 1988 Seminar. He began with a brief review of some recent activities of the FASB that have been generally unpopular within the business community. And he acknowledged that some of the criticism was justified. The Board had perhaps been a little naive about the costs and difficulties in implementation of some of its rules. But he explained that it is difficult for the Board to know just what to do about the comments on the exposure drafts it publishes. If modifications are made in response to criticism from the business community, then the Board is accused of caving in to business interests. If, on the other hand, no modifications are made, then the Board is accused of not listening to the business community.

Turning to tasks that lie ahead for the Board, rather than past rule making, Leisenring said he had been asked to focus on provisions for post-retirement health care. Almost all corporations expense post-employment health care costs as they are incurred. Leisenring's view is that these costs should be accrued over the employment period, since they are in effect another form of deferred compensation. A legitimate question is whether the promise of post-retirement health care benefits constitutes a true liability. Some companies believe they can relieve themselves of the obligation, but Leisenring thinks this is unlikely. The Board has concluded that the promise is indeed a corporate liability.

It is not difficult to determine over what period of time the liability should be accrued. The service period is the appropriate one. It is more difficult to determine just how the accrual should be performed. Post-retirement health care involves even more uncertainty than pension planning. For example, adding a pension benefit guarantee for a surviving spouse involves a cost that is quite trivial to that of adding health care benefits for a surviving spouse. The latter is likely to double the cost of the plan. This means that predicting the marital status of an employee at retirement becomes an important part of predicting total cost.

Another source of uncertainty has to do with the trend in health care costs. These costs rise not just because of general inflation, but because of significant technology change which is very difficult to predict. Treatment for AIDS is also likely to become a major factor in post-retirement health care costs.

Leisenring commented on the fact that there is no tax deduction for accrual of post-retirement health care benefit costs, or even for the funding of these costs. And the federal deficit problem seems to preclude any likelihood of Congress providing a tax deduction.

In the end, the FASB will probably require the accrual of a non-deductible expense. This will not be a welcome development within the business community. Some will argue that the cost is so great it cannot be accounted for. The impact on financial statements will simply be intolerable. Leisenring argued that the cost itself might be lower if corporations were accounting for it.

Turning from the health care issue, Leisenring commented on the problems that have been raised for accounting by the enormous innovation in financial instruments, including off-balance sheet financing. There have been complaints that the FASB has failed to provide rules where rules are needed. But in fact accounting concepts simply cannot cope with many of the new instruments. In some cases it is impossible to identify an instrument as debt or equity. An example is a puttable preferred stock. Transactions that transfer risk, such as those involving options, present great difficulties to accounting rule making. There is no accounting model that can deal satisfactorily with volatility. Leisenring does not feel that financial instrument innovation is the source of any abuses that the Board should be correcting, but he does feel that we are not accounting consistently (and perhaps intelligently) for these instruments.

He closed with the observation that the Board's agenda is very full, and that much of this agenda is politically sensitive. Restructurings clearly call for attention. Almost all of the restructurings announced in recent years involve a reduction in net worth. More attention must be paid to the time value of money. The real problem is not so much how to determine present values, but what to do after recording a
present value on a financial statement. This is an issue that is likely to be dealt with in the next year or two.

51. THE MANAGER’S PERSPECTIVE (Fall, 1988)

William L. Fouse, Chairman, Mellon Capital Management Corp., argued that the only true model for the corporate pension plan is the extended balance sheet. The corporation, not the pension fund, really lies behind the promised benefits. The pension fund is a corporate asset, and indeed a profit center. It is true that the law limits flexibility in the use of the pension fund asset, but the tax-free status of this asset helps to offset that limit. It is a great mistake, Fouse said, to isolate the pension fund. It has to be integrated into the overall corporate financial plan.

One of the consequences of the integration is the observation that when interest rates and cost of common equity capital is high, then it makes sense to put money into the pension fund, which will benefit from these conditions, rather than into other corporate assets. On the question of the risk level of the pension fund, a sensible theory is that the level itself is not important. Stockholders of the corporation, through their own portfolios, can cope with almost any level of risk. Fouse argued strongly, however, that once the risk level is chosen the corporation should stick to it, and not adjust that riskiness from time to time to deal with current conditions.

He saw a serious problem in the unreasonable expectations of the typical plan sponsor. In the aggregate, he said, plan sponsors expect their pension funds to achieve returns that industry, which is the source of the returns, cannot produce. The unreasonable expectations are fed by a preoccupation with performance measurement and lead to pressure on managers to produce more than these managers are capable of. The performance measurements themselves may be misleading, because of attrition in the managers whose results are reported. A comparison between manager performances and plan sponsor performances shows that our reporting systems make the managers appear to do much better than the plan sponsors. One of the consequences of the performance race is that turnover has gone up very substantially over the years.

Overall then, active management simply does not offer the successes that plan sponsors seem to expect. Fouse went further, identifying four methods by which one might seek superior returns, classifying these methods in terms of the likelihood that they will pay off. His first class included conventional stock selection, group rotation, and market timing. His belief is that market efficiency makes it unlikely that value can be added by any of these three approaches. There is a little more hope for added value in anomaly exploitation and factor tilts. A third class offers even more hope: tactical asset allocation and ergodic strategies. Finally, he felt the greatest opportunity lies in new financial instruments.

Fouse’s prescription for a pension fund is 20% indexed international securities, 40% indexed domestic equities, and 40% indexed domestic fixed income securities. He would use futures arbitrage and tactical asset allocation, varying the equity percentage from something like 30% to something like 70%. He would include no real estate and no venture capital. He believes that retired people probably already have a significant investment in real estate and industrial corporations already own significant real estate. Investing in venture capital simply involves too much effort. His final message was that one cannot make money playing efficient games.

Frederick L. Muller, President, Atlanta Capital Management, presented the view of the active investment manager. He described the business of active management as undergoing considerable change, chiefly because plan sponsors have been disappointed with results. In the 1970s, active managers won billions of dollars away from banks that had traditionally been the choice of pension plan sponsors. But by the 1980s these active managers had underperformed the indexes.

Muller suggested some changes to bring about improvement. First, rather than relying on consultants and measurement services, plan sponsors should organize among themselves to publish long term performance records for managers. The records should properly reflect risk and return in all markets. He believes that on the basis of more complete measurement, sponsors and managers will understand each other much better.

Second, the manager should see how investment management fits into the overall
corporate financial plan. The manager should understand the returns that are required to meet promised benefits and should have an understanding of the balance sheet effects of different performance results and how management will view those effects.

Third, sponsors must lengthen the time horizon over which they judge performance. Muller would like to see a period on the order of ten years.

Fourth, although the asset allocation decision is being handled better today than in the past, sponsors are not making the best use of their managers. Managers can give insights that will add considerably to the work of consultants, in the field of asset allocation.

The key to improved performance by active managers lies essentially in closer cooperation between the sponsors and the managers. Muller is confident that active management will continue to be a positive force in the market, and that enough active managers will be in a position to claim success due to skill rather than chance. He expects to see some consolidation of active managers, a greater focus on narrow strategies to hold on to large clients, a reduction in risk taking and therefore lower returns than have been seen in the past.

52. THE CONSULTANT'S PERSPECTIVE (Fall, 1988)

Wayne H. Wagner, Partner and Chief Investment Officer, Plexus Group, began with the proposition that the corporate pension fund is not a profit center but a deferred compensation vehicle. The funds within the trust belong to the pension beneficiaries, liabilities are not fixed nor are assets. Assets and liabilities are related and must be considered together. Prudent risk taking requires an understanding of the nature of assets and liabilities and their relationship.

Three factors affect both assets and liabilities. The first of these is inflation, and its consequences are obvious. The second has to do with productivity gains. Wagner argued that just as active employees benefit from a rise in their standard of living, retirees expect to continue that benefit. This is an important element in anticipating the level of benefits. Finally, interest rate fluctuations bring about fluctuations in the value of both assets and liabilities.

The pension plan is viewed rather differently by participants in the planning process. The actuary is concerned with the importance of discounting conventions using long-term interest rate assumptions. The accountant is concerned with marking to market under FASB 87. The employee benefit specialist focuses on the benefits to be provided, and the corporate pension staff are generally concerned with building pension fund assets to reduce the risk of unpleasant surprises. Wagner's view is that the employee benefit specialist probably has the most useful view.

FASB suggests the superiority of bonds in funding pensions, because bonds neutralize liabilities, treated by the accountant as "anti bonds". But bonds do not deal with productivity risks. Indeed, FASB 87 fails to deal with a number of risks.

Wagner identified five components of risk: interest rate variability, inflation sensitivity, productivity gain sensitivity, the risk of economic depression, and the political risk in testing the patience of the corporate funding source.

Under the FASB view, the pension promise is a fixed dollar obligation. But the employee benefit view is better: a promise to provide a decent standard of living after retirement. While investment in bonds minimizes the risk perceived in the FASB view, investment in stocks minimizes the productivity risk. Ultimately the goal of pension management is to build a downstream surplus. Wagner's prescription for achieving this is "buy equities".

Keith P. Ambachtsheer, Principal, Ambachtsheer & Associates, contrasted what he perceived as the approach to pension planning perhaps a decade ago, the present approach, and what he sees as a future approach.

In the past, beneficiaries seemed to play no role, plan sponsors played only a small role, and it was left to investment managers and to actuaries to deal with the assets and liabilities, respectively, with no back and forth communication.

Moving to the present, it is useful to think of the defined benefit pension plan as essentially a financial institution. The decision making has changed from the past. The plan sponsor is now the most important. Politicians exercise and influence, by way of taxes, concern
for the protection of beneficiaries, and concern for the governance process. Beneficiaries, or potential beneficiaries, exert a greater influence.

Ambachtsheer next turned to the pension fund balance sheet, dealing first with liabilities and second with assets. There are two views of the nature of the pension promise. Viewing the pension obligation, as ERISA does, as a fixed dollar obligation, we determine the liability if the plan were to be terminated now. A second view is what Ambachtsheer called the "going concern" view, a more realistic concept of the pension promise. The valuation of the promise using the going concern view is about twice the valuation using the fixed dollar/termination view.

Turning to the asset side of the balance sheet, Ambachtsheer commented that 95% of the performance of the assets is a function of the overall asset mix policy, while 5% is a function of the manner in which this policy is implemented. Setting the asset mix policy takes us back to the nature of the liabilities. One must determine what is the "risk-free" asset for this fund, and we cannot identify it without knowing the nature of the pension promise. Defining what is risk in the asset portfolio also requires deciding what is the nature of that promise. The "spread" target, that is, the difference between the target rate of return and the return on a risk-free asset, is important. Ambachtsheer feels that historic spreads are a poor guide to a reasonable target.

Implementation of the asset mix policy means converting the policy into day-to-day activity. The driving force will be cost effectiveness. Passive management is attractive because of low cost. Ambachtsheer expects to see more pension funds managed in-house in order to reduce costs. Reduction in trading costs will be important. Plan sponsor officers are taking on more of the decision making function and we are likely to see more investment in illiquid assets like real estate and venture capital.

Ambachtsheer suggested that more thought be given to two aspects of the asset management process. One of these is governance, that is how policy decisions are to be made and how they are to be implemented. The second is information. FASB 87 has introduced some useful accounting measures. But beyond this, Ambachtsheer believes we need to rebuild management information systems to enable plan sponsors to make better decisions.

Looking to the future, Ambachtsheer commented that we must first clarify just what the defined benefit promise consists of. We must also clarify what the post-retirement health care promise consists of. We must consider the possibility of a trend to defined contribution plans and all that this might lead to. And finally, we can hope for a shift from investment managers who are either qualitative or quantitative to investment managers who are both.

53. THE PLAN SPONSOR'S PERSPECTIVE (Fall, 1988)

John W. English, Vice President and Chief Investment Officer, The Ford Foundation, discussed the Foundation approach to asset allocation. He pointed out that the Foundation is neither a college or university endowment, nor a pension fund. There is no flow of gifts or contributions to the funds of the Foundation. Apart from the proceeds of investment activity itself, the flow goes only in one direction, to the support of Foundation programs.

He traced the history of the Foundation from its establishment in 1936 with a $25,000 gift from Henry Ford, to the present. And he described the six major program areas, to which the Foundation will contribute approximately $180 million this year.

Next he traced the market value of the assets of the Foundation from 1960 through 1987. Markets performed poorly over the period 1960-74, and demands on the Foundation to support programs were heavy. Spending was determined by an estimate of the total return on the portfolio, and the estimates were simply higher than anything the market could deliver. By 1974 the Trustees of the Foundation had to decide whether they would simply spend the Foundation out of existence over the next five years, or strive to remain a perpetual source of program support. The Trustees selected the latter strategy, and cut both staff and spending drastically.

The period 1974 through 1987 saw a substantial rebuilding of the assets of the Foundation, to a level between $5 and $6 billion today. Much of the success is due to Franklin Thomas, who became President of the Foundation in 1979.

The investment strategy of the Foundation is essentially to earn an income
equal to 5% of the market value of the Foundation assets, plus enough to account for inflation. This enables the Foundation to meet the 5% payout requirement of the Internal Revenue Code and at the same time maintain the purchasing power of the invested assets and therefore the purchasing power of the income and spending. The strategy eliminates the former dependence on accurate estimates of total return, and imposes a discipline on spending that precludes dissipation of the assets.

In 1982, English came from managing AT&T pension funds to become Chief Investment Officer of the Foundation. The Foundation had lost most of its internal investment management staff, and a substantial amount of the assets were turned over to outside managers. As the internal staff was rebuilt, funds were brought back. At the present time, about $4 billion are managed internally and $1 billion externally. Internal management covers fixed income securities, common stocks, and real estate. English commented that outside management costs about 3 1/2 times as much as internal management. His experience is that the chief problem encountered with internal management is an inability to pay compensation adequate to attract good people. This is particularly true of non-profit organizations.

Robert E. Shultz, Vice President, Pension Asset Management, RJR Nabisco, Inc., entitled his presentation "Laws of Optimality". His topic was really the structure of the pension management process, and his initial question was if the present structure disappeared overnight, how would we rebuild it?

His proposal was essentially to replace the use of multiple managers managing multiple portfolios, to somehow drawing on the insights of multiple managers to manage a single portfolio. The managers would then become advisors to the single portfolio rather than managers of their own individual portfolios.

Shultz had gone back to the early work, in 1978, of Barr Rosenberg on the subject of multiple management. Rosenberg had identified some deficiencies and some potential deficiencies in the multiple manager system as it exists today. Many of these deficiencies are rather well known. Among them are the unnecessary costs of offsetting transactions, and inappropriate levels of aggressiveness as each manager acts as if he or she were the sole manager.

In support of his proposition, Shultz pointed out that the multiple management system at best matches optimal management of a centralized portfolio making use of multiple advisors. It is the aggregate performance, not the performance of individual portfolios that matters. And the aggregated normal holdings should coincide with the overall target of the sponsor.

He discussed the key functions of a multiple advisor system, and described some of the developments that he believes are carrying us toward this system. The use of normal portfolios is part of the transition. Completion funds, and growth in passive management are also part of the process, as are an increased focus on minimizing transaction costs, and a realization that plan sponsors are in a position to sell liquidity to the marketplace.

There are factors standing in the way of a transition to multiple advisors. The conflict between business risk and investment risk in the minds of the manager/advisor is important. Some sponsors do not bring out the best in their managers, in particular by not encouraging appropriate aggressiveness. And there is no organization of plan sponsors to bring about a change in the system. Shultz did not believe a single plan sponsor can do it alone.

A move to multiple advisors puts the plan sponsor in the position of senior portfolio manager, and calls for a new kind of in-house management. More needs to be known about trading costs, and some new needs for consulting services would develop. The master trust business, on the other hand, would likely diminish.

Shultz conceded that he did not yet have in mind a procedure to implement a multiple advisor system. He was not sure how to establish accountability and how to judge the value added by each advisor. Finally, he observed that a significant difference between multiple managers and multiple advisors lies in the fact that all trading would be transferred from the managers to the plan sponsor organization. And he did not know whether a significant part of the value added at present by multiple managers might lie in their trading activities.
A lively discussion concluded the presentation, with a number of participants questioning whether one could get from managers acting as advisors the value they are accustomed to furnishing through a direct management activity.

54. Panel Discussion - PLANNING AND STRUCTURING THE PENSION PLAN (Fall, 1988)

The panel was moderated by William L. Fouse, and consisted of those who had spoken earlier in the day: Keith Ambachtsheer, John English, Frederick Muller, Robert Shultz, and Wayne Wagner (see summaries 51, 52 and 53).

Most of the discussion centered on the proposal that had been made by Shultz for the replacement of multiple managers by multiple advisors, assisting the plan sponsor to manage a single portfolio. Muller, as the active manager on the panel, was asked how active managers might be expected to react to the Shultz proposal. He felt it was hard to describe the probable reaction without more specific details on how Shultz’s proposal would work. He did think that active managers could be more useful to sponsors than they had been in the past. And he had no disagreement with Shultz at the abstract level.

A question was raised whether an active manager could do a significantly different job for one client from the work done for other clients. Shultz felt that a single plan sponsor could not implement his proposal. Several large pension funds would have to act at the same time.

Ambachtsheer suggested that the use of artificial intelligence to analyze data might make it possible for a computer to process information from the advisors. Shultz said, however, that the IBM experience was that the value added by managers often depends upon intuitive rather than quantitative work, something that could not easily be computer processed.

It was suggested that one might derive alphas for individual stocks from a normal portfolio and the portfolio recommended by a manager. This would be one way to get advice from a manager and incorporate it in a sponsor portfolio. There was some disagreement here, with others commenting that the value added by the manager goes beyond alphas and client interaction may be important. Further discussion stressed the importance of fundamentals like productivity in earning power and dividend paying capacity, rather than market pricing, that are important inputs to assembling a portfolio. Ambachtsheer commented that the sponsor wants a portfolio that best matches the pension liabilities and that generating superior cash flows is more important than achieving capital values.

Another suggestion was that managers’ recommendations may be based on quite different macroeconomic views and different styles of investing, so that it may be difficult to take the opinions of several managers to construct a single portfolio.

A question was raised as to why in-house management has not gone much further to replace the use of outside management. English commented that compensation is a serious problem, as he had observed earlier for the Ford Foundation. Shultz observed that there is a very high business risk to the in-house manager with only one account.

Shultz closed with a question he had posed earlier during his own presentation. Is trading an integral part of the contribution a manager makes, so that it is not practical to transfer all of the trading function to the plan sponsor?

55. A PRIMER ON FASB 87 (Spring, 1987)

Martin Leibowitz, of Salomon Brothers, Inc., introduced the seminar program as one focusing on asset allocation for retirement funds in the light of FASB 87. He referred to FASB 87 as an event that may change the world for pension plan sponsors, consultants and investment managers. The financial measures and conditions that are the focus of the FASB statement have indeed always been with us, but plan sponsors have never had to take them very seriously. Now, under the new rules, asset allocation policies and perceptions of risk in different asset classes may have to be drastically revised.

For example, for a sponsor that is concerned about the balance sheet effects of an Accumulated Benefit Obligation (ABO) surplus or deficit, the safest asset class is probably long bonds while the highest risk class is probably cash.

The problems of dealing with FASB 87 are complex and multidimensional, and the seminar had been organized to present a
number of experts who would explore aspects of that complexity.

Lawrence N. Bader, of Salomon Brothers, Inc., distributed two papers by himself and Martin Leibowitz, both published by Salomon Brothers: An Overview of FASB Statement 87 on Pension Accounting, and FASB 87 - Equivalent Funding Ratios: Pension Surplus Trends - 1980-86.

Bader began with a brief introduction to FASB 87 and how it operates. He took as an example a pension fund for which the value of assets is $12 million and the present value of all projected benefits is $20 million. The following table sets out the components of the $20 million obligation. And it aggregates those components into classes that have a special significance for reporting purposes. The first three components in the table make up the "Vested Benefit Obligation." Prior to 1980 accounting rules called for the disclosure of the VBO in financial statements.

Present Values of Benefits

- Benefits to Retirees: $3 million
- Benefits to Terminated Vested Employees: $1
- Benefits to Active Vested Employees: $4
- Vested Benefit Obligation (VBO): $8
- Benefits to Active Nonvested Employees: $1
- Accumulated Benefit Obligation (ABO): $9
- Effect of Future Salary Increase on Past Service: $5
- Projected Benefit Obligation (PBO): $14
- Future Service Liability: $6
- All Projected Benefits: $20 million

Adding the present value of benefits to active nonvested employees to the VBO gives the "Accumulated Benefit Obligation" or ABO. Prior to FASB 87, a plan sponsor was required to disclose the ABO in a footnote in the Annual Report. But under FASB 87, beginning in 1989, the extent to which the ABO is less than the value of the assets in the plan must be recorded as a balance sheet liability. To the extent that this liability results from plan amendments, or to the extent it existed at the date of transition to FASB 87, the sponsor may record an "intangible asset" to offset the liability. But to the extent that the shortfall results from actuarial losses, net worth on the balance sheet will have to be reduced. (This reduction will not be accompanied by a reduction in reported earnings.)

Adding the effect of future salary increase on past service liabilities to the ABO gives the "Projected Benefit Obligation" (PBO). While the PBO has no direct balance sheet implications, as does the ABO, it does affect the determination of pension plan expense on the income statement. And it is by itself an important figure since it is the number most likely to be used by financial analysts and the number that will be used in valuing acquisitions.

Continuing with his example, Bader described the pension plan expense calculation under FASB 87, and turned next to illustrate what would have happened to reported funding ratios for 1980 through 1986 under the FASB 87 rules. The results were dramatically different from what corporations actually reported over those years. In general, a rise in interest rates leads to a decline in the value of a bond portfolio and generally to a decline in the value of pension plan assets, but also to a reduction in the present value of the pension obligations. Similarly, a decline in interest rates will generally lead to a rise in the value of the assets and a rise in the ABO. In general, it turns out that the duration of plan liabilities is somewhat larger than the duration of assets, so that as interest rates decline, the ABO will rise faster than the asset value, and the funding ratio will fall. This is indeed what happened over the years 1980 through 1986. Bader demonstrated the effect with a numerical example, using a hypothetical plan.

He went on to compare the funding ratios of the Fortune 500 industrials, as they were actually reported and as they would have been reported under FASB 87. As actually reported, the funding ratio rose from 99 percent to 134 percent. The picture given is of a steadily strengthening pension funding position. Applying FASB 87 leads to a decline in the funding ratio from 186 percent to 155 percent from 1980 through 1986. Bader's conclusion was that as of 1986 the pension plans of the Fortune 500 industrials are indeed in good shape. The funding ratio is well above 100 percent. But the reported trend is misleading.

FASB 87 presents the plan sponsor with four important variables. The ABO is important, since it has direct balance sheet implications. The prospect of reducing net worth by the amount of the ABO deficit may be
alarming to some plan sponsors. A second important measure is the PBO, since a PBO deficit calls for both interest and amortization charges as part of pension plan expense. The PBO is also an important measure in the minds of financial analysts. Pension plan expense is an important income statement item; and the fourth item to be considered is the cash flow representing the sponsor's contribution to the pension fund. The contribution differs from the reported plan expense and is not affected by FASB 87.

It is difficult, if not impossible, for a plan sponsor to manage all four measures simultaneously. Planning that is designed, for example, to minimize changes in the ABO surplus or deficit may lead to substantial changes in reported pension plan expense, and vice versa.

In closing, Bader stressed the complexity in managing four measures and the importance of an integrated view of assets and liabilities in developing asset allocation policies. Traditional approaches to the allocation problem may prove quite ineffective in dealing with FASB 87.

56. LEGISLATIVE INITIATIVES
(Spring, 1987)

Dallas L. Salisbury, of the Employee Benefit Research Institute, distributed copies of the EBRI monthly publication Issue Brief.

His theme was the pending congression action with respect to pension plans, and in particular what prompts congressional action and what business can do to influence that action.

He began by commenting on the importance of sometimes quite erroneous reported statistics and other news about the state of pension plans. The tax legislation of 1986, for example, reflected a conviction on the part of congressional leaders that defined benefit plans should be made more attractive and defined contribution plans less attractive, in order to counter a perceived shift from defined benefit to defined contribution plans. In Salisbury's opinion, the congressional response was an overreaction brought about by exaggerated news reports.

A good deal of congressional attention is focused on underfunded plans, on the one hand, with important consequences for the Pension Benefit Guaranty Corporation, and on the other hand, where plan terminations and asset reversions have been substantial. The steel companies in particular have confronted and may continue to confront the PBGC with very substantial unfunded liabilities to be satisfied. There is even some possibility that Congress may decide to create a special vehicle for dealing with pension liabilities of these companies.

The PBGC has been considering an increase in the flat premium which is at present $8.50 per participant. Putting the PBGC on a sound basis might require an increase to almost $40. At the same time, Congress is considering the possibility of variable premiums, with the premium level depending upon the degree of underfunding. There is also some interest in Congress in a premium that would be calculated to reflect the PBGC experience. Curbing reversions of plan surpluses seems to be on the minds of congressional leaders, with proposals that only the excess above 125 percent of termination cost would be recoverable.

Another proposal being considered is one to move pension plans to a control group concept, so that overfunding of one plan would have to be used to cover underfunding of other plans, before any surplus could be recovered.

Salisbury suggested that considerable congressional attention will be given to the matter of health benefits to retirees, and that corporations will have to recognize that liabilities for health benefits may be of the same magnitude as liabilities for pension payments. As a practical matter health benefits are fully indexed, and not just to the Consumer Price Index but to medical costs which have been rising at more than twice the rate of the CPI. Salisbury referred to an estimate of $1.9 trillion for the aggregate unfunded liability health benefit liability. There have been suggestions that the PBGC should extend its coverage to health benefits as well as pension benefits. Plan sponsors are probably going to have to think in terms of the total package of pension and health benefits, and may be inclined to lower the pension benefits as health benefits become more significant in cost. There is some likelihood that the limits on contributions to defined benefit and defined contribution plans may be extended to cover a combination of pension plan and health benefits.

Pension portability is another issue being considered in the Senate and the House.
The consequence might then be earlier cash distributions from a pension plan than had been anticipated by the plan sponsor.

Salisbury closed with some criticism of the failure of plan sponsors to make adequate representations to congressional committees and in labor department hearings. When representatives of plan sponsors have appeared at hearings, they have generally taken the position that all is well with pension plans and that none of the proposed changes have merit. There have been no positive proposals for dealing with obvious difficulties in the system. At the same time, labor representatives and organizations of retirees have made strong representations for positive action. It will not be surprising, therefore, if Congress passes legislation that plan sponsors find unattractive.

57. THE ECONOMICS OF PENSION ASSET AND LIABILITY MANAGEMENT (Spring, 1987)

Irwin Tepper, of Irwin Tepper Associates, began his presentation with a brief discussion of FASB 87, building on the earlier presentation by Lawrence Bader (summary #55).

He identified four key changes in pension fund accounting brought about by FASB 87. First, liabilities are to be valued using "market" rates of interest. Second, the Accumulated Benefit Obligation (ABO) now has explicit consequences for the sponsor's balance sheet while the Projected Benefit Obligation (PBO) is the basis for determining pension expense. Third, shorter amortization periods are prescribed for funding deficits; and fourth, the expense calculation has been standardized.

Tepper considered the impact on the net period pension cost of a decline in interest rates. The service cost will increase because the discount rate has decreased. The interest cost may increase or decrease. Interest cost is represented by the product of the market interest rate and the net liability. A decline in interest rates reduces the interest rate multiplier but at the same time increases the net liability. When the interest rate equals the reciprocal of the duration of the liability, the interest cost is relatively unaffected by a decline in interest rates. The decline in interest rates will increase the PBO, but the change in the expected return on assets is hard to estimate. It is possible to hedge the interest cost by structuring assets so that a change in interest cost will be offset by an equal change in expected return on assets. But the service cost will also change, and it is quite difficult to hedge the total pension expense. Tepper observed that hedging the pension cost may in many cases be of little importance. If the pension cost is very low, then even substantial swings in that cost from year to year will have little importance to the sponsor's income statement.

Bader had observed in an earlier session that the plan sponsor is faced with a number of measures to focus on in seeking to minimize risk. Tepper described a number of choices among actuarial policies. In arriving at the settlement rate, which is the rate to be used in discounting pension obligations, one might choose stability and make use of the PBGC table of rates. It turns out that the long rates published by the PBGC are fairly stable, which will lead in turn to stability of present values of pension obligations. On the other hand, the use of market rates may achieve a lower cost at the expense of some volatility.

Moving away from the dictates of FASB 87, Tepper suggested that the sponsor attempt to define cost and liability such as to provide the best practical answers to these questions:

1. How large are the pension liabilities?
2. How well funded is the pension plan?
3. How volatile are the liabilities?
4. What is the duration of the liabilities?
5. What will pension costs be now and in the future?
6. What are the effects of capital market movements?

Tepper concluded by tabulating six different methods for arriving at a measure of pension fund liabilities. For each, he indicated whether or not three projection factors -- eligibility, salaries and benefits, and service -- were relevant in applying the valuation method. The table follows.
Six Methods of Determining Pension Liabilities
(with the appropriate cost measure)

<table>
<thead>
<tr>
<th>Eligibility</th>
<th>Salary and Benefits</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method and (Measure)</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Terminal Cost (PBGC Liab.)</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Explicit Contract (Vested Liab.)</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Unit Credit (ABO)</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Projected Unit Credit (PBO)</td>
<td>yes</td>
<td>yes/no(1)</td>
</tr>
<tr>
<td>Implicit Contract (&quot;Economic Liability&quot;)</td>
<td>yes</td>
<td>yes(2)</td>
</tr>
<tr>
<td>Entry Age (PV of Projected Benefits)</td>
<td>yes</td>
<td>yes/no(1)</td>
</tr>
</tbody>
</table>

(1) yes if specified in plan document
(2) yes if economically relevant whether or not included in plan document

Tepper noted that the fifth and sixth methods, which would probably be the choice of a financial economist, would not be acceptable either under FASB 87 or under ERISA.

58. INTEGRATED ASSET ALLOCATION (Spring, 1987)


Sharpe undertook to answer the question whether, with FASB 87 in effect, the asset allocation decision needs to take fund liabilities into account. Traditionally, portfolio selection to optimize assets has been based on characteristics of the assets and risk preferences of the plan sponsor. FASB 87 raises the possibility that optimizing should consider the characteristics of the plan liabilities as well as those of the assets.

Sharpe considered four possibilities. In the first case, the focus was entirely on expected asset value. And the optimizing process was aimed at determining the efficient frontier tracing out the tradeoff between expected asset value one period in the future and the standard deviation of asset values. This approach was, in effect, the traditional portfolio optimizing process.

The second approach focused on the expected Accumulated Benefit Obligation (ABO) surplus, and established the efficient frontier representing a tradeoff between expected surplus and standard deviation of the surplus. The third approach substituted a Fully Indexed Benefit Obligation (FBO) for the ABO, and the fourth approach substituted a Half Indexed Benefit Obligation (HBO) for the ABO.

The asset portfolio was assumed to consist of six classes of assets used in the Multiple Markets Index of First Chicago Investment Advisors. The asset classes were bonds, large stocks, small stocks, foreign stocks, foreign bonds, and real estate. The expected returns, standard deviations in returns, and correlations, were taken from an article in the Financial Analysts Journal of March-April 1986, by Brinson, Diermeier and Schlarbaum. Assumptions were made with respect to the starting asset value, the starting ABO, FBO, and HBO.

The efficient frontier where attention was focused on expected asset value included, as might have been expected, the Multiple Markets Index itself. And the asset mix with minimum standard deviation consisted almost entirely of treasury bills. The efficient frontier when the focus was on the expected ABO surplus, differed substantially from the efficient frontier in the first case, for standard deviations below about 10 percent. Sharpe's observation was that for plan sponsors with very low risk tolerance, it makes a great deal of difference whether the asset allocation decision takes liabilities into account, and focuses on the ABO surplus rather than on the expected value of fund assets. At higher levels of risk, it does not matter much.

In calculating the ABO, Sharpe had taken a composite of ten pension plans that had been the subject of prior study, and had discounted the accumulated benefit stream, using an estimated term structure, to get present values of the liabilities by months, and from these present values to establish liability returns by months. It turned out that the standard deviation of ABO returns was quite high, comparable to that for large stock returns. In applying the portfolio optimizing process it was necessary to establish correlations between the
Sharpe had drawn his conclusions with respect to the importance of including liabilities in the allocation process, on the basis of the plan sponsor's risk tolerance. But he also observed that the risk tolerance itself might be a function of the liability. He suggested that a high tolerance for risk may go with a large surplus, and a low tolerance for risk may go with a small surplus or deficit. The question then, whether it is important to consider liabilities in making the asset allocation decision, is a little more complicated than it at first appeared.

59. THE NATURE OF THE PENSION AGREEMENT (Spring, 1987)

D. Don Ezra, of the Frank Russell Canada Company, distributed a document entitled The Nature of the Pension Agreement.

Ezra began his talk with a discussion of the origins of his paper. Pension reform has become an important issue in the Province of Ontario. Two task forces have been formed by the provincial government, one to study the investment of public sector pension funds and a second to consider inflation protection for beneficiaries of public and private pension funds. As in the United States, a great many Canadian corporate pension funds have actuarially determined "surpluses." At the same time, indexation, or protection against inflation, is generally not promised under Canadian corporate plans. Arguments have been raised in Ontario in favor of requiring corporations to use plan surpluses to fund indexing.

The document Ezra had distributed was prepared as a discussion paper for the Ontario task force on the investment of public sector pension funds. It was Ezra's position that before addressing the issues that had been raised in Ontario and attempting to reconcile the very different positions of plan sponsors and labor representatives, it was necessary to lay out and understand the nature of the pension contract itself. The issues themselves he identified as: Who should govern the pension fund? Should employees be represented in that governance? Who owns the pension fund "surplus?" What do employees expect of a pension fund, and why?

Ezra classified pensions into three general categories. Some pensions can be considered a company gratuity, and indeed the origin of the pension was as a company gratuity. Some can be regarded as resting on implicit expectations. There may be no written

ABO returns and returns on the asset classes. Sharpe had established proxies for the asset classes and had calculated correlations of asset returns and the ABO returns.

The asset mix with the minimum ABO surplus risk consisted over 90 percent of bonds, with small amounts in foreign bonds and foreign stocks.

In establishing the value of the FBO liability, Sharpe discounted the accumulated benefit stream at a real rate rather than a nominal rate of interest. Since the real rate is less than the nominal rate, the FBO is larger than the ABO. And since real rates move less than nominal rates, the FBO is less variable than the ABO. Sharpe had assumed that the expected real return would be constant across maturities and constant through time, and that the liquidity premium would also be constant across maturities and constant through time. These may be rather restrictive assumptions, and he warned that his results may be contradicted by later research done with fewer assumptions.

It turned out, as one might have expected, that the standard deviation in the FBO was quite low, comparable to the standard deviation in treasury bill returns. And the correlation between FBO returns and treasury bill returns was quite high. In applying the optimizing model, the efficient frontier where the focus was on the expected FBO surplus was almost identical to the efficient frontier where the focus was simply on expected asset value. It apparently made no different then, whether or not the asset allocation model incorporated liabilities.

The HBO case fell somewhere between the ABO and FBO cases. Where payments to pension beneficiaries were only half indexed (meaning that the beneficiary received half the promised nominal amount and half the promised nominal amount increased by the inflation rate) the standard deviation of HBO returns was about half the standard deviation of ABO returns, and the correlation between HBO returns and bond returns was quite high. At standard deviations below about seven, it made a significant difference whether the optimizing process incorporated liabilities or simply made use of asset values. The asset mix with the minimum HBO surplus risk consisted of close to 30 percent bills and over 60 percent bonds. Small proportions of foreign bonds and real estate were included.
agreement, and perhaps no legally enforceable right to a pension, but employees have come to believe that they will receive pensions at retirement age. Finally, some pension benefits can be identified as the rights of the employees.

Pursuing the "rights" category, Ezra subdivided it into asset related rights and liability related rights. In the first case, the assets are the measure of the benefit. This would be the case in a pure defined contribution plan. In the second case, the plan assets serve as security for the right. This would be the case in a pure defined benefit plan.

A further classification recognized that there is a spectrum ranging from pure defined contribution to pure defined benefit plans. For the pure defined benefit plan, the fund should be regarded as the vehicle to insure promised benefits. Moving along the spectrum, the next category is the contributory defined benefit plan, and a third category is one in which employer and employee share both risk and reward. Moving further, to the fourth category, we find a hybrid type of pension plan. If investment returns are unexpectedly high, the employee gets the benefit. If investment returns are unexpectedly low, the employer has the obligation to provide a defined benefit.

A fifth category is the multi-employer category, generally found in the construction industry, a plan that from the point of view of the employer is a defined contribution plan, but from the point of the employee is a defined benefit plan. Finally, at the end of the spectrum is the pure defined contribution plan. Each employee is individually the investment client, and all of the value of the assets belongs to the employees.

The question of who is the investment client, and who is entitled to any plan "surplus" varies as one goes across the spectrum. In the intermediate categories, it is extremely difficult to identify logically to whom surplus really belongs, and who is the true investment client.

To compound the difficulty, the "surplus" is obviously more a matter of opinion than fact, since it rests on a variety of actuarial assumptions and is at best an estimate. There is, however, a tendency for the actuarial estimate to be interpreted as a precise indication of an amount of money that belongs to someone, either the employer or the employees.

Throughout all of the categorization, Ezra stressed the vital importance of communication with employees. His hope was that in identifying different categories it would be possible to bring labor and employers to a common understanding of the relative positions and rights of employers and employees. But employers can create substantial problems for themselves, unwittingly or unwittingly, through the manner in which they describe pension benefits to employees.

Under the topic ultimate benefits, Ezra discussed reasons why employees may expect to retire on more generous terms than the pension agreement explicitly provides. Expectations can arise from the history of the plan, including a pattern of improvements from time to time and employer statements of an intention to keep benefits up to date and to meet competition.

Some environmental factors may also lead employees to expect ultimate benefits better than those promised by the plan. If the compensation package has been negotiated as a whole, then employees may feel that the benefits of unexpectedly high investment returns belong to them and not to the employer. In some cases employers tell employees that their pension benefits are worth a specific percentage of direct compensation, thereby encouraging the employees to anticipate that this ratio will be maintained in the future.

Ezra concluded with some comments on pension plans in Canada and the United Kingdom, suggesting some differences and some similarities to U.S. plans. Most Canadian and U.K. private pension plans are defined benefit plans, final pay related. There is very little indexing in the private sector in Canada, although indexing is rather common in the United Kingdom, largely due to regulation. In both countries, most funds are in "surplus." In Canada, if the surplus represents two years of contributions then there can be no more tax deductible contributions. In the U.K., if the surplus exceeds 5 percent of plan liabilities, then the excess surplus must be used up in the form of benefits. For the time being, surplus withdrawals are frozen in Ontario, pending legislation. In the U.K., there is a 40 percent tax on surplus withdrawals. With respect to winding up pension plans, Canadian plans are generally quite specific on this and give the sponsor the right to wind up. In the U.K., plans are generally
not explicit and a winding up of a pension plan is a very rare event.

60. PENSION PLAN PERFORMANCE AND THE ECONOMIC IRRELEVANCE OF FASB 87 (Spring, 1987)

Richard A. Ippolito, of the Pension Benefit Guaranty Corporation, distributed two papers. One was entitled Turnover, Fees and Pension Plan Performance and was by Ippolito and John A. Turner of the U.S. Department of Labor. The second was entitled The Economic Irrelevance of FASB 87.

Ippolito's presentation dealt with two topics. He began with FASB 87 and observations on the enormous amount of money and energy that was obviously being expended by plan sponsors and their consultants on planning to cope with the new accounting rules. In Ippolito's opinion, these efforts and spending are greatly overdone. He subscribes to the position Jack Treynor has presented before the Q-Group on several occasions, to the effect that economics and accounting are two completely separate subjects. FASB 87 should have no impact on the economic value of the pension promise by a plan sponsor. It may well shift expenses from one year to another, and it may well bring about balance sheet changes. But it should not affect the economic value of the sponsor company. It therefore should be of little or no interest to investors.

Ippolito expanded on these thoughts in observing that since the publication of FASB 36 and the enactment of ERISA, sufficient information is publicly available (to be coupled with the insights of financial analysts) to enable analysts to value pension obligations, and hence to make appropriate adjustments in the value of the corporation for its pension obligations. More specifically, in the absence of FASB 87 corporations already reported unfunded pension liabilities and disclosed the interest rate at which those liabilities were calculated. He believes that analysts can probably recalculate the liabilities at different interest rates, and are in a position to form their own opinions with respect to unfunded liability, opinions that will not be altered by the new disclosures provided for in FASB 87.

Furthermore, Ippolito's conclusion was that the methodology used in FASB 87 was in the direction of producing worse estimates of the value of pension obligations rather than better estimates.

Ippolito did acknowledge that the balance sheet entries called for by FASB 87 could result in violation of debt covenants, and one participant pointed out that a serious decline in the stock market could lead to increasing ABO deficits, reduced net worth, and a number of defaults that would not otherwise have taken place.

Moving on from FASB 87, Ippolito urged that we pursue the sort of analysis that had previously been described by Don Ezra, attempting to determine just what the terms of the pension contract are. Ippolito had spoken to the Q-Group before on the subject of the implied contract between the plan sponsor and the beneficiaries. He indicated that some of the research he is now undertaking is aimed at relating benefit changes to investment performance. He commented that the amount of inflation adjusting in the 1970s was much lower than in the 1960s, and suspected that this had a good deal to do with market performances in the 60s and 70s. He suggested that we do not yet know the conditions justifying termination of a plan, conditions that should be a part of the implied contract.

In referring back to Sharpe's presentation on allocation models he welcomed this sort of analysis, demonstrating how the allocation policy may vary with plan sponsor objectives. He suggested that we explore funding and allocation policies that are consistent with the implied terms of the pension contract.

He turned next to the matter of investment performance of pension plans. When he was with the Department of Labor he had found very little data available. Subsequently, more data have been assembled and some studies have been done, but he is far from satisfied that we are yet in a position to judge the quality of investment performance of pension plans. The research he has just completed indicates that mutual funds on the whole have performed much better than pension funds. The superiority of the mutual funds has been greatest for stock funds. While balanced mutual funds have on the whole performed better than balanced pension funds the difference has not been great. Turnover has been a matter of considerable interest to Ippolito, and he has found some evidence that
turnover in stock portfolios is negatively correlated with rate of return.

Describing his own work, soon to be published in the Financial Analysts Journal, Ipolito referred to it as a first step in careful reporting of pension plan performance. He observed that while many studies are published on mutual fund performance, pension plan performance seems strangely neglected.

61. PANEL DISCUSSION: HOW PLAN SPONSORS ARE DEALING WITH THE NEW ENVIRONMENT (Spring, 1987)

Robert Schultz, of RJR Nabisco, Inc., introduced the panel. He explained its purpose was to give some perspective on how sponsors are planning to deal with FASB 87. He put forward two assumptions he had asked the panelists to consider: that the relevant liability in a pension plan is the economic going concern liability, and that this liability is inflation sensitive. He had asked the panelists to consider five questions on the subject of asset allocation: (1) How concerned should we be about short-term fluctuations in economic or accounting values? (2) What are the long-term capital market prospects and risk premia? (3) How should accounting gains and losses be allocated? (4) At termination time, how should the plan settle with current and former employees? (5) How should the pension plan and the corporate capital structure be integrated for planning and tax purposes?

Arthur Williams III, of Simms Capital Management, Inc., spoke from a background of investment manager and plan sponsor. His position was that the only thing that matters in economic terms is cash flow or assets that produce cash flow. In the long run what we want is a high rate of return on pension assets. Changes in accounting rules which do not affect cash flow should not change investment practices. At the same time, he recognized that there is a question of who controls the company and the pension cash flows. As long as control is at stake, then the corporate stock price is a matter of concern and if accounting changes are thought by analysts and investors to matter, then there is some economic significance to accounting changes. Second, asset allocation policy must consider the utility of people. That is, we have to take account of the reactions of those who control the investment of plan assets to sharp upward and downward moves in the marketplace.

Chuck F. Lemons, of Manville Corp., indicated a major concern with increased volatility in pension expense as a result of FASB 87. This volatility has implications for, among other things, executive compensation, acquisitions, collective bargaining agreements, regulated industries, "cost plus" government contracts, loan covenants, and stock analysts. His conversations with analysts indicated that they will probably forecast earnings on an ex-FASB basis.

He enumerated a number of ways of controlling volatility. There is a natural hedge that comes from the operations of the business itself. Benefit policy can also be adapted to control volatility. Accounting policy offers a number of opportunities for reducing volatility. These include selection of the discount rate formula, changing the expected salary growth rate to conform to changes in the discount rate, modification of the expected long-term rate of return, use of the "10 percent corridor" in computing pension cost, and asset smoothing.

Investment policy offers further opportunities to control volatility. This may take the form of matching asset and liability durations. Portfolio protection can help, and Manville is already using this mechanism.

Lemons concluded that hedging to reduce volatility does run counter to maximizing long-term return on assets within reasonable risk tolerance limitations, a strategy that seems reasonable and that indeed may be mandated by ERISA. In describing the current Manville strategy, he said that a long-term perspective is being maintained. Planning is asset driven, but there is an awareness of the importance of changes in plan liabilities. Volatility will be reduced where the methods used will not interfere with a sensible investment strategy. Manville will continue its practice of portfolio hedging with an aggressive equity position.

William N. Searcy, of Monsanto Co., said that FASB 87 poses a dilemma for the sponsor. Does one manage assets, or liabilities, or surplus? The focus at Monsanto has been in the past on assets, and it will continued to be on assets.

The Monsanto plan is well funded. But the composition of liabilities may change. Indeed, one quarter of the participants at the end of 1985 were retirees and this fraction had risen to one half by the end of 1986. Monsanto
is willing to take substantial risk in its investments. Its horizon is long term.

Monsanto adopted FASB 87 as of January 1, 1986, in the United States and Canada. The actuarial assumptions are 8.5 percent for the settlement rate (using the PBGC rate as a guide), 8.5 percent as the expected long-term rate of return and 6.5 percent as the salary increase rate. The latter two rates are unchanged since before switching to FASB 87. In selecting these rates, Monsanto had examined ranges being used by other companies. These were 8.0 percent to 11 percent for the settlement rate, 7.5 percent to 12 percent for the long-term rate of return, and 4.5 percent to 8 percent for the salary increase rate.

Under the new rules, pension expense went from $65 million in 1985 to $16 million in 1986. Contributions went from $65 million in 1985 to 0 in 1986. Monsanto has not had to reflect any pension plan liability on its balance sheet. Searcy also reported a negative cash flow (with no contributions) of 14 to $15 million per month to pay benefits. The funds have been drawn from the common stock portfolio.

Overall, Monsanto has not changed any of its practices as a result of adopting FASB 87, although the new rules did sharpen awareness of the volatility of reported liabilities and pension expense. In 1987, Monsanto has lowered the settlement rate by twenty-five basis points (the PBGC rates are down one hundred basis points). There is a continuation of negative cash flow, and funds are still being taken from the common stock portfolio. So far, the company is sacrificing stability of pension expense and funded status in favor of superior long-term investment performance.

Michael J. Gallimore, of IBM Canada, Ltd., commented on the issues Robert Schultz had raised, and also indicated some differences between the U.S. and Canadian positions on pension plan accounting. He observed that in Canada, the accounting rules offer less specific guidance and more flexibility. Disclosure requirements are less burdensome than those under FASB 87. In Canada, the discount rate and the rate of return are not necessarily different. A study of expected returns produced a median of 7.5 percent, while the median actual rate of return for the last five years was about 17 percent.

Plan sponsors in Canada are generally proceeding very cautiously with any changes because of pending legislation. It is likely that two year vesting and portability will be required by law, and indexing may be required as well.

Gallimore said that he could understand a decision to change asset management strategy to meet accounting requirements, if one believes that the stock market puts a high value on short-term stability in earnings. This observation reflected back to some thoughts expressed by Williams, an earlier speaker on the panel. But plan sponsors in Canada appear to be generally oriented toward asset management, with little interest in accounting. Gallimore thinks that by the 1990s, pension accounting will drive some investment objectives and benchmarks.

He warned that plan sponsors have not yet felt the impact of pension expense volatility. Many who do not take the problem seriously at the present time may change their minds.

62. THE NEW ACCOUNTING PERSPECTIVE (Spring, 1987)

Pat McConnell delivered the presentation on behalf of Lee Seidler, who was unable to attend. She distributed a Bear, Stearns publication dated April 29, 1986, entitled Deciphering the New Pension Accounting.

She began with the observation that as an accountant she believed that accounting should record but not influence economic events. It appears, however, that there will be economic events triggered by FASB 87, just as economic events were triggered by FASB 8, dealing with foreign currency translation. When the FASB discovered that companies were taking action to avoid the volatility imposed on them by FASB 8, that ruling was abolished. And McConnell thinks it very likely that FASB 87 and FASB 88 will be reviewed and revised in the near future.

She discussed some of the background of FASB 87 and FASB 88 to put them in perspective. Conditions and concerns of the early 1970s, including widespread underfunding of pension liabilities, prompted the FASB to put pension accounting on its agenda. The focus at that time was on the pension obligation; no one appeared to worry very much about the statement of pension expense. The extent of underfunding contributed to the impression that
capital markets recognized a corporate pension obligation and required explicit recognition of that obligation on the balance sheet.

McConnell turned to DuPont's reporting of its net pension cost for 1985, as an example illustrating the manner in which FASB 87 operates. The first item was service cost, that is the present value of benefits earned by employees in 1985. The cost must be calculated using the "projected unit credit" method, which makes cost a function of the average age of active employees. As this average age changes, the cost will change. The next item, the interest cost, is the product of the "settlement rate" and the Projected Benefit Obligation (PBO). The settlement rate, as had been pointed out earlier in the seminar, is the rate that would be charged by an insurance company for a contract the sponsor could use to settle its obligation.

The DuPont example shows that the return on assets incorporated in the pension cost is the expected and not the actual return. Finally, the amortization of net gain is based upon the "net asset at transition," which is the accumulated favorable investment experience up to the date of adoption of FASB 87. This net asset is amortized to pension expense over the average remaining service period of active employees.

Turning to the balance sheet adjustments called for FASB 87, McConnell observed that the balance sheet adjustments and the statement of pension cost are quite unrelated, a highly unusual circumstance in normal accounting. The balance sheet requires computation of the Accumulated Benefit Obligation (ABO) instead of the PBO. The surplus or deficit is calculated from the unsmoothed fair market value of plan assets at the date of the balance sheet. A surplus of assets over the ABO will never be shown on the balance sheet, but beginning in 1989 any deficit must be reflected by a charge to net worth.

A number of apparent inconsistencies and anomalies in the income statement and balance sheet entries prescribed by FASB 87 can be explained by compromises to relieve plan sponsors of sudden and serious unfavorable adjustments to financial reports. The end result, McConnell said, is far from satisfactory.

In conclusion, she expressed the opinion that FASB 87 will violate the general proposition that accounting rules should not influence economic events. Among the responses one might anticipate are termination of defined benefit plans and a switch to defined contribution plans, or a use of a dedicated bond portfolio to fund a pension plan, or the purchase of a GIC. Portfolio insurance may be another alternative. Indeed, we can anticipate a variety of new financial products designed to deal with issues raised with FASB 87.

63. INSURANCE AND THE PENSION FUND (Spring, 1987)

Andre F. Perold, of the Harvard Graduate School of Business Administration, distributed a paper by himself and Jay O. Light entitled Conditional Allocation Policies for A Self-Insured Pension Fund.

Perold began by discussing with the seminar participants what constitutes a dynamic allocation strategy, what are the criteria for choosing a good strategy, and what are examples of dynamic allocation strategies. He next developed, with the aid of the participants, graphs of portfolio value, working with a risk-free asset and a risky asset. Five dynamic allocation strategies were pictured. Trivial cases were investment entirely in the risk-free asset and investment entirely in the risky asset. More interesting strategies were fifty:fifty buy and hold, fifty: fifty rebalanced, and a Constant Proportion Portfolio Insurance (CPPI) strategy. The last of these involves establishing a floor below which the value of the portfolio is not to be permitted to drop. One could begin with a fifty:fifty allocation of assets. As the value of the risky asset declines, the portfolio is shifted out of the risky asset into the risk-free asset. If the decline continues, the shift will continue until all of the funds are in the risk-free asset when the value of the portfolio has reached a preselected floor. A graphical comparison of the three interesting strategies showed that the fifty:fifty rebalancing strategy provides no protection when the risky asset becomes worthless; the fifty:fifty buy and hold strategy preserves 50 percent of the portfolio value when the risky asset becomes worthless, and the constant proportion portfolio insurance strategy can preserve any chosen fraction.

All of the strategies belong to a simple family, which can be represented by the following equation:

\[ \text{Dollars in Risky Assets} = X(\text{Assets} - \text{Floor Value}) \]
If the floor is set equal to zero and X is set equal to .5, we have the fifty-fifty with rebalancing strategy. If the floor is set equal to 50 percent of initial assets, and X is set equal to one, we have the fifty-fifty buy and hold strategy. If the floor is set equal to 80 and X is set equal to 2, we have a CPPI strategy, with a guaranteed floor value of 80 even if the risky asset becomes worthless. Making use of some of the figures in his handout, Perold traced actual allocations for the CPPI strategy for different values of the total assets and of the parameter X.

At this point he raised the question which strategy might be most appropriate for a pension fund. The answer to the question would have to depend upon the risk aversion of those in charge of the fund. The CPPI strategy is appropriate for those whose risk aversion increases as the portfolio value approaches the floor value. If one were to regard the floor value as the liability of a pension fund, then one could picture risk aversion rising as the fund surplus diminishes, and reaching infinity when the fund surplus reaches zero.

In applying the CPPI strategy to pension funds, Perold’s suggestion was that the risk-free asset is the asset that immunizes the liability stream. He pointed out that in fact there may be no such asset. In this case, it may be impossible to completely assure the chosen floor value but one may be able at least to come close. The floor need not be the full amount of the pension liability; it may be some fraction of that liability. If the floor is chosen to be the liability, then what we are doing with the CPPI strategy is simply guaranteeing that the surplus will never become negative.

Returning to the choice of allocation policy, Perold examined the traditional approach, which has been to select an appropriate asset mix for all time, and to plan to maintain that mix regardless of market conditions. But it is very difficult to make the initial selection of a mix. And it may be difficult for a plan sponsor to deliver the chosen mix. The point here is that as the value of risky assets rises and falls it is hard for those charged with responsibility for the pension plan to adhere absolutely to their originally chosen asset mix. Finally, it may be appropriate to change the asset mix from time to time, and the traditional method does not provide any means for making adjustments.

Perold next enumerated the advantages of a dynamic strategy like the CPPI. First, downside protection is easily managed. Second, the strategy forces a discipline of always taking an appropriate amount of risk at every point in time. Third, the strategy avoids panic selling and general overreaction to market moves.

He turned next to the subject of participating annuities, and discussed a specific example in which a plan sponsor with an overfunded annuity was able to retrieve some of the surplus in the plan, transfer the plan to an insurance company, and still participate in upside investment performance in the plan. A CPPI strategy in the management of the funds after the transfer was a critical part of the transaction.

64. FASB 87/88: THE INTENT AND THE PROSPECT
(Spring, 1987)

Douglas A. Love, of BEA Associates, offered a summary of much of what had been said at this seminar on the subject of FASB 87, and added his own evaluation of what the new statement had accomplished and how one should view pension costs and liabilities.

He began with the intent and the history of FASB 87/88. A first objective was to achieve comparability as a matter of public policy. The senior creditors of any corporation, and the PBGC, need a clear picture of total corporate liabilities and the equity cushion that is there to protect them. A second objective was to unbundle pension funding and pension expense. For most corporations the important item has been the contribution, since for tax purposes this, and not the expense, creates the deduction. This peculiarity persists, of course, under the new rules since the tax law has not changed. But there is a value to clearly distinguishing the expense from the funding.

A third objective has been to achieve consistency between pension assets and pension liabilities, by valuing both, for at least some purposes, at market. A fourth objective was to achieve balance sheet recognition of the pension liability. Trust law at one time insulated the company from liability for pension claims. Then ERISA permitted pension claims to become corporate liabilities. It is now appropriate to put the pension liability on the corporate balance sheet.

Love pointed out that there are still some serious weaknesses in FASB 87. These
are largely the result of constraints that were imposed on the Board, including a need to minimize the transition impact of the new rules, and a need to minimize dramatic changes in the volatility of expenses and liabilities. It is not surprising that the introduction of such a substantial reform as FASB 87 was accompanied by compromises that will require correction in the future.

A major weakness in FASB 87 lies in the pension expense measure. Pension expense is a function of the rate of return on pension assets, which is considered a negative element of expense. Love argued that this is quite wrong. To begin with, the claim of an employee is a claim on a pension, not on an asset. The pension expense is truly a function only of employees' claims. Love provided an example:

End of Year Present Value of Pension Liabilities 298.9
Beginning of Year Present Value of Pension Liability 255.1
Plus Pension Benefits Paid During Year 21.2
Pension Cost 85.0

His argument favored folding the pension accounts into the corporate accounts, treating pension fund assets as simply another corporate asset, and the present value of pension benefits payable as another corporate liability. One of the interesting conclusions to be drawn from his definition of pension expense is that the only way to reduce that expense is to reduce benefits.

Following his merger of the pension and other corporate accounts, he presented what he would consider to be appropriate balance sheets, statements of sources and uses of funds, and changes in retained earnings. Before FASB 87, these statements could have been constructed by corporate insiders. Following the adoption of FASB 87, the information is available that will enable outsiders to construct these statements.

Love moved on to the matter of implications of FASB 87 for asset allocation. He set up the following example to demonstrate the interest rate exposure of a pension plan:

Pension Plan Interest Rate Exposure

<table>
<thead>
<tr>
<th>Assets</th>
<th>Value</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Bonds</td>
<td>36</td>
<td>4</td>
</tr>
<tr>
<td>Stocks</td>
<td>72</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Liabilities &amp; Net Worth</th>
<th>Value</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pension Liabilities (ABO)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retirees</td>
<td>60</td>
<td>8</td>
</tr>
<tr>
<td>Actives</td>
<td>40</td>
<td>15</td>
</tr>
<tr>
<td>Pension Net Worth</td>
<td>20</td>
<td>-18</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>6</td>
</tr>
</tbody>
</table>

The duration of the pension net worth is the interesting item. It works out to -18, because the duration of total assets must equal the duration of total liabilities and net worth. Now the very negative duration on net worth shows the substantial exposure of net worth to interest rates. It is not unlikely that this exposure will suggest some form of hedging or a different asset allocation. The asset allocation shown follows the 60-30-10 allocation that has been popular for many years and that has appeared to serve pension funds rather well. Referring to the efficient frontier calculations presented earlier in the seminar by William F. Sharpe (summary #58), Love demonstrated that the 60-30-10 asset allocation may lie on an efficient frontier so long as our focus is on pension fund assets, but it does not lie on an efficient frontier where our focus is on pension surplus. A further element to be considered, however, is that pension liability changes are driven by more than interest rates. Changes in wages, and in the aging of the work force, bring about liability changes against which stocks may prove to be a much better hedge than bonds.

Pursuing the matter of hedging pension fund liabilities, Love pointed out that the time horizon is very important. In the short run, long bonds may provide a substantial hedge but this hedge becomes less effective over longer horizons. Common stocks, on the other hand, provide a very poor hedge in the short run but a much better hedge in the long run because of the higher expected return. He closed by discussing portfolio insurance and concluded that it may have a particularly important role to play since the implementation of FASB 87.
PROGRAM TRADING

65. THE REAL TRUTH ABOUT THE INTERDAY RELATIONSHIP BETWEEN PROGRAM TRADING AND STOCK INDEX PRICE VOLATILITY
(Spring, 1988)


Grossman began with a brief discussion of market making. The New York Stock Exchange trading market is organized around the specialist, and specialists make markets in one stock at a time. No specialist makes a market in a package of stocks. Those who wish to trade packages of stocks find the specialist system very expensive and inefficient in that all of the stocks in the package cannot be traded simultaneously. The futures market in indexes performs an important market making function. The price risk of an entire index can be transferred in a single transaction. Those who make markets in futures bridge the time gap between buyers and sellers and not only serve their customers but relieve specialists of taking the risk on many stocks to deal with asynchronous customer orders.

If a large number of institutions are following similar trading strategies, and wish to buy or sell either index futures or the stocks themselves at the same time, they may have difficulty. Portfolio insurance strategies may increase stock price volatility. But this is not the result of the existence of futures markets, it is the result of institutional trading strategies.

Grossman had tested the impact of program trading on volatility over the period January 2 - October 30, 1987. On the so-called "triple witching days" volatility was not particularly high. So program trading did not appear to be an important contributor to volatility. Volatility was of course extraordinary on October 19, but program intensity was far from extraordinary. Volatility was also very high on October 20, but program intensity was close to zero.

A regression of the logarithm of the high/low ratio on the program trading intensity produced nothing of significance. A regression of the same dependent variable on the ratio of total DOT orders to total trading produced a quite significant relationship. A large proportion of DOT orders did lead to high volatility. Finally, a regression of the same volatility dependent variable on the ratio of non-program DOT orders to total transactions produced an even more significant relationship. It would appear that the non-program component of DOT orders has the greatest impact on market volatility.

Grossman's conclusion was that there is no evidence to attribute significant market volatility to program trading. At the same time, market participants have not learned to trade large baskets of securities as they have learned to trade large blocks of a single common stock. He guessed that a price impact of 50-75 basis points could probably be avoided by the adoption of better trading strategies.

66. THE IMPACT ON MARKET LIQUIDITY OF PROGRAM TRADING AND DYNAMIC HEDGING STRATEGIES
(Fall, 1987)

Sanford J. Grossman, The John L. Weinberg Professor of Economics at Princeton University, distributed a paper entitled An Analysis of the Implications For Stock and Futures Price Volatility of Program Trading and Dynamic Hedging Strategies. He began his talk with the observation that the pricing of new derivative securities can often be based upon a dynamic trading strategy in existing securities, futures and options. Furthermore, dynamic trading strategies are used in portfolio insurance as a substitute for new securities. The justification here is generally a reduction in transaction costs. But the elimination of the use of the security itself carries a significant cost. The price of a security conveys important information, and the substitution of a synthetic strategy for the security means that the price information is foregone.

The feasibility (or the cost) of carrying out an insurance plan will depend upon how many other investors have similar plans in mind. Since the insurance plans do not involve actual put options, one cannot see in the prices of puts any reflection of the prevalence of insurance plans.

As an illustration of the operation of such an insurance plan, Grossman suggested the
The investor begins with $1,000. The price of the stock to be invested in is $10 a share. At the end of the first time period the share price will either have risen by 10% to $11, or it will have fallen by 10% to $9. Further, during the second period the price will either have risen by 10% or fallen by 10%. At the end of the second period then, the stock price will be $12.10, $9.90, or $8.10. The investor wishes to maximize expected wealth at the end of the second period, subject to the constraint that the ending wealth must be no less than $900. The strategy is to invest the entire $1000 in 100 shares of stock, at time zero. At time one the investment will be worth either $1100 or $900. In the latter case, all of the shares must be sold and the $900 cash preserved until the end of the second period. In the former case, the investment remains in the form of shares, and the value of the portfolio at the end of the second period will be either $1210 or $990. The trick to this strategy is that if the investment performance during the first period is a decline of 10%, it is crucial that the investor dispose of the entire stock investment at precisely the point in time when the 10% loss is incurred.

It is true that the investor may hold more shares than would have been held in the absence of the insurance strategy, but at the same time the investor is more sensitive to its ability to buy or sell shares at the end of the first period.

Grossman went on to a slightly more complex and more generalized model, in which a fraction of all investors adopt portfolio insurance strategies, while the remainder do not. And in this case, the stock price at the end of the first period is affected by good or bad news, and by the implementation of portfolio insurance strategies as described above. Market timers (or market makers) will provide the liquidity desired by those implementing portfolio insurance strategies to the extent that the provision of liquidity appears profitable and to the extent that they have capital available. On the assumption that these market makers will have made their capital allocation decisions somewhat in advance of the time the liquidity is desired, it is important to the success of the portfolio insurance strategies that market makers have a sound basis for making those allocation decisions. Grossman's point was that these decisions are difficult to make in the absence of information about the plans of investors with respect to portfolio insurance and the liquidity they may be looking for. If portfolio insurance were implemented through the purchase of put options, the demand for put options would be reflected immediately in the price of those options, and market makers would respond to those prices.

The problem then is that the use of dynamic trading strategies to implement portfolio insurance gives the market no advance information on the likely demand for liquidity, and Grossman suggested some ways of providing that information. Sunshine trading, an innovation of Kidder, Peabody, is one possibility. Trades are announced 15 to 30 minutes in advance, to attract investors willing to provide liquidity to portfolio insurance traders. Grossman felt the time interval may be too short to deal with the problem he sees. He suggested that the stock exchange might publish the extent of limit orders at prices away from the current price, so that market makers could gauge the depth of the market and have time to prepare to provide the liquidity that can be furnished at a profit.

In closing, Grossman conceded that what he had presented was entirely a theoretical picture of deficiencies in the use of trading strategies as a substitute for derivative instruments, and some possible ways of dealing with these deficiencies. He had as yet no empirical data to accompany this theoretical discussion, but the empirical work is underway.
REAL ESTATE

67. A LOOK AT REAL ESTATE DURATION (Fall, 1987)

A paper entitled A Look At Real Estate Duration by David J. Hartzell, David G. Shulman, Terrence C. Langetieg, and Martin L. Leibowitz of Salomon Brothers was distributed.

David Shulman, Vice President, introduced the presentation. Following research at Salomon Brothers into the duration of common stocks and duration of portfolios, it seemed natural to explore the sensitivity of equity real estate to interest rate movements. Having explored sources of data on equity real estate prices, the authors had concluded that none of it was satisfactory. The modeling that was reported had proceeded on the basis of plausible numerical estimates.

Three factors were considered to affect the duration of real estate. The first is the lease structure and Shulman discussed the variety of leases ranging from long term fixed rate leases for which the rent is virtually independent of inflation, to inflation indexed leases. The second factor is the local supply and demand cycle, which probably cannot be diversified away. And the third factor is the deterioration or enhancement of the property. As a practical matter, we do not know whether this effect can be diversified away.

The valuation model took the following form:

\[
\text{Current Property Price} = \text{Present Value of net rents} + (\text{Present Value of expected rent for } T \text{ years}) \times \text{Property Price} \\
\text{where } P_0 = \text{Present value of future cash flows generated by a property, or group of properties} \\
T = \text{Terms of Lease} \\
NR_t = \text{Net rental income in year } t \\
g = \text{expected growth rate in property value which reflects the expected economy-wide inflation rate} \\
u = \text{unexpected growth rate in property value which reflects unexpected inflation, local supply and demand imbalances, as well as obsolescence and enhancements which are interrelated with local market conditions.} \\
(g+u) = \text{total property price appreciation in year } t \\
k = \text{investor's required rate of return} \\
E(\cdot) = \text{expected value operator}
\]

The equation represents the value of a bond whose principal is inflation indexed and whose coupons range from zero to full indexation.

Terence Langetieg continued the presentation, pointing out that the model combines characteristics of a bond and of a stock. The price is sensitive to changes in the discount rate as well as to inflation induced changes in the expected growth rates. It turns out that for an increase in the expected inflation rate from 5% to 6%, with a real rate of about 6%, and where the net rent is adjusted for inflation every 5 years, the implied duration is about 2.1 years.

A second measure that is of interest is the flow-through of inflation. The expression for price sensitivity to a change in the expected inflation rate is as follows:

\[
\text{Price sensitivity to a change in the expected inflation rate} = -D_{DDM} (1-\lambda) \Delta I \\
\text{where } D_{DDM} = \frac{1}{k-g} \text{ duration of the dividend discount model, } \lambda \text{ is the inflation flow-through, and } \Delta I \text{ is the change in the expected inflation rate.}
\]

David Hartzell presented some numerical results, showing estimates of the implicit inflation pass-through for various interest rates and lease contract terms. He concluded with a discussion of the interrelationships among interest rates, the inflation pass-through and duration. A change in interest rates
representing a change in the inflation rate alone will imply a very low duration if the pass-through is substantial. But if the real rate of interest rises, the inflation pass-through is not helpful to the real estate owner, and the implied duration will be high. Sometimes these relationships are hard to observe since changes in the second and third factors referred to above - local supply and demand and the deterioration or enhancement of property - will also be present.

68. COMMERCIAL REAL ESTATE RETURNS AND PORTFOLIO ALLOCATION DECISIONS (Fall, 1987)

Michael Miles, Professor at the University of North Carolina, discussed research that has led to the development of improved statistics on the performance of equity real estate investments, statistics that will greatly facilitate the incorporation of real estate in asset allocation models.

Beginning with some data on the importance of real estate as an investment vehicle, Miles indicated that a major factor that has held institutions back from substantial real estate investment is the lack of believable performance data. He referred to a variety of sources of data, and the reasons why the data tend to consistently identify real estate as offering very high risk adjusted returns, very low correlations with returns on other asset classes, and apparent protection from both expected and unexpected inflation. It is not surprising that investors simply will not accept these conclusions.

Miles described the development of a factor model making use of data on 347 actual property sales tabulated by NCREIF. Factors were grouped under 5 major qualities: national location, local location, physical structure, operating history, and lease characteristics. As the research progressed, it appeared necessary to increase the number of factors. But increased factors call for more observations. So the value of the factor model is still somewhat limited by the observations so far available.

The results of the model are encouraging. Correlations between real estate and stocks and real estate and bonds seem plausible, and the following mean returns, standard deviations, and coefficients of variation were presented:

<table>
<thead>
<tr>
<th></th>
<th>Mean Return</th>
<th>Standard Deviation</th>
<th>Coefficient of Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Stocks</td>
<td>4.9%</td>
<td>6.8%</td>
<td>1.40</td>
</tr>
<tr>
<td>Corporate Bonds</td>
<td>4.3%</td>
<td>4.0%</td>
<td>0.91</td>
</tr>
<tr>
<td>Treasury Bills</td>
<td>2.2%</td>
<td>0.5%</td>
<td>0.24</td>
</tr>
<tr>
<td>Office Real Estate</td>
<td>3.3%</td>
<td>9.2%</td>
<td>2.82</td>
</tr>
<tr>
<td>Retail Real Estate</td>
<td>3.0%</td>
<td>4.4%</td>
<td>1.47</td>
</tr>
</tbody>
</table>
Immunization is another way of dealing with sensitivity of a bond portfolio to changes in interest rates. As a practical matter, however, Elton does not believe that immunization has lived up to its promise. If we are to rely on immunization for protection against interest rate risk, we need much better ways of selecting and testing immunization measures.

An important element in controlling exposure to interest rate risk (which may involve either eliminating the risk or capitalizing on interest rate forecasts) is the availability of new types of securities. Strips are chiefly valuable in avoiding reinvestment risk. Futures contracts are useful in enabling the investor to modify quickly the maturity of a portfolio without sacrificing return to liquidity.

Gruber continued the presentation, with a historical review of risk and return. Harry Markowitz, in his Journal of Finance article in 1952, converted the intuitive understanding of diversification into something quantitative. He provided definitions, measurements, and solution techniques to bring portfolio management beyond security selection. The Markowitz methodology, however, brought with it statistical data requirements that investment practitioners were not prepared to supply. An answer to this difficulty was offered by William Sharpe in 1963, in the Single Index Portfolio Model. The single index model was succeeded by multi index models proposed by Farrell, King, Cohen and Pogue, and Elton and Gruber themselves, among others.

The index models were succeeded by equilibrium models, of which the Capital Asset Pricing Model is probably the best known. More complex equilibrium models have come along. In some cases, the complexity has arisen from attempts to improve upon the extreme assumptions of the CAPM. In some cases, because the same set of assumptions will never apply to all investors, the passive portfolio becomes something other than the market portfolio. One example is the Wells Fargo Dividend Tilt Portfolio for tax exempt investors.

When Richard Roll pointed out a fallacy in tests of the CAPM, and that in fact the model was untestable, Stephen Ross proposed the Arbitrage Pricing Model as an alternative. In this model, we begin with a return generating process rather than a utility function. Identifying
the process takes the place of finding the market portfolio.

Next, Gruber commented on the notion of efficient capital markets. Following substantial academic research that tended to confirm the efficiency of securities markets, there began to appear a series of reports of "market anomalies." Examples were the small firm effect, the low P/E effect, and the January effect. In speculating on why these anomalies have appeared, Gruber offered three possible explanations. One is that investors are simply not capable of understanding the anomalies and arbitraging them away. The second is that we have not yet discovered the correct equilibrium model, and therefore may be finding anomalies that do not really exist. The third explanation is that we may be observing random rather than systematic anomalies, without knowing how to distinguish one kind from the other.

Elton returned to continue with his second topic — controlling the distribution of investment outcomes. From Markowitz we learned the form of the distribution of expected rate of return with variance, for a security or a portfolio. The idea of riskless lending and borrowing modified this distribution somewhat. Then we discovered that it is possible to truncate the lower range of the distribution of rates of return, and a variety of techniques were proposed for accomplishing this. The question facing us now is not so much how to modify the distributions but how to match particular distributions to particular investors.

Gruber continued with further discussion of the arbitrage pricing theory and how it can be used to deal with risk. Going back to the problem of the return generating process, Gruber pointed out that if this process involves both compensated and uncompensated risk, we will look for a portfolio that diversifies away the latter and incorporates an appropriate amount of the former. But when we turn our attention beyond the portfolio itself, as we are likely to do when we are dealing with bonds, to look at the liabilities that are serviced by the portfolio, our risk choices begin to change. First, we may not want to diversify away the uncompensated risk. If the liabilities are subject to the same risk (interest rate risk, for example) it may be possible to adjust the risk exposure in the portfolio to balance the exposure on the liability side, with no sacrifice in rate of return. And with respect to compensated risk, the total risk exposure may be accomplished not by minimizing the exposure in the portfolio but by matching that exposure to the exposure on the liability side.

Gruber's conclusions were that we should probably focus more attention on the return generating process in order to improve immunization techniques, and we should recognize matching techniques as essentially dynamic, rather than attempting to put long-term matches into place.

Elton next turned to his third topic, that of portfolio performance evaluation. Evaluation techniques designed to judge the quality of portfolio management generally focus on either a risk adjusted rate of return or comparison of a manager to an equilibrium or naive performance model. But if the true risk exposure of the manager is varying over time, then none of these techniques may work very well. Elton observed that he and Gruber are now working on a way of dealing with managers who are attempting to time the market, and whose volatility is therefore constantly changing.

Elton also commented on problems peculiar to judging the performance of passive fund managers. In general, the performance of an index fund is compared to the performance of the relevant index. But difficulties can be encountered due to transaction costs, assumptions with respect to reinvestment of inflows, and the matter of how close a match to the index is demanded and supplied.

Gruber returned to discuss the fourth and last topic -- risk in forecast data. He raised three questions: is there informational content in forecast data? If so, how can investors capitalize on it? How should we deal with forecast risk?

There has been enough empirical research to provide an affirmative answer to the first question. That is, security analysts are able to add to the forecast information implied in security prices. Gruber acknowledged the work of Farrell, Ambachtsheer and others in answering the second question, but believed that so far we have only scratched the surface. With respect to his third question, it appears that forecast risk is something we have not learned to deal with. It cannot be diversified away, and indeed it is not clear that we even understand its nature.
70. RISK MANAGEMENT -- THE PRACTITIONER’S VIEW
(Fall, 1986)


He identified six elements in risk management. These were cash inflows, cash outflows, time horizon, future uncertainty, initial investment and utility for risk and return. As a preliminary to identifying what should be the most appropriate model for dealing with risk management, Fogler reviewed four important types of existing models. The first type is based upon theoretical utility functions. Models of this type can deal with all six elements identified above, and are the most general. However, they involve extraordinary mathematical complexity. Models of the second type are mean-variance models. These produce neat solutions, but are not very general. They usually involve a single time period, and therefore ignore the cash inflows and outflows. Risk is described by normal distributions for utility functions other than quadratic, and risk is not related to initial wealth. It turns out, however, that the lack of generality is not fatal, and most of the six elements can be dealt with in one way or another.

The third type is the immunization model. Fogler pointed out that when Redington proposed immunization in a 1952 article he had in mind immunization of a very wide scope, dealing with a broad range of uncertainties. As a practical matter, however, immunization models are generally quite limited in their application and fail to deal, for example, with inflation risk. Fogler's fourth type of model is the asset/liability simulation model. These are the most complete risk management models to date, containing all six elements except for a specific utility statement.

Before continuing with a discussion of the models themselves, Fogler turned to a consideration of the sources of risk. The allocation of portfolio assets to different classes of security has of course an important bearing on the risk in investment outcome. Another important, but easily overlooked element, is cash outflow. Fogler showed by means of a graph the distribution of market value of a portfolio in real dollars twenty years in the future, for three different asset allocation strategies and three levels of outflow. The risk of under-performing the target, which was to maintain purchasing power, did not vary a great deal on the basis of asset allocation, but was substantially affected by whether the outflows were set at 4 percent of market value or at 5 percent.

Coming back to the models, Fogler discussed immunization in the "widest sense." He quoted Redington:

The word "matching" implies the distribution of assets to make them, as far as possible, equally as vulnerable as the liabilities to those influences which affect both.

As an example, Fogler offered a portfolio, coupled with a set of liabilities to be serviced by the portfolio, with both assets and liabilities subject to four factors: unanticipated changes in each of short-run inflation, short-run real returns, long-run inflation, and long-run real return. If unanticipated changes in the factors are independent and if the percentage change in the present value of the asset cash flows and the liability cash flows is a linear function of the factors, then total immunization will be achieved if the sensitivity of the asset inflows can be made equal to the sensitivity of the liability outflows. However, when we come to establishing the sensitivities we are faced with considerable difficulty. Fogler had simply attempted to identify whether the sensitivities should be positive or negative, and encountered a number of cases where he was not sure. His conclusion was that immunization against all risk is impossible, and more specifically we probably cannot immunize against long-run inflation risk.

In an effort to achieve a comprehensible and therefore useful method of presenting investment results to give an understanding of risk and the control of risk, Fogler offered a state-time-return matrix. He chose twelve time-state scenarios. The first four corresponded to the worst phases of a business cycle. The next four corresponded to high and unanticipated inflation, and the last four to economic depression. For each scenario, and for different time horizons, the ultimate result was shown in terms of lost purchasing power. From the results, a number of conclusions can be drawn quickly and easily. First, risk is a function of time horizon. The investor who can afford to wait faces much smaller terminal loss probabilities. Second, different asset allocations have a
substantial effect on short-term downside risk but not as much effect at long-term horizons.

Fogler drew four final conclusions. The first was that long-run certainty depends on better real productivity, and we probably cannot fully immunize against productivity risk. Second, we should strive to achieve better risk sharing. This involves corporations, their active employees, and retired pensioners. Third, better risk management models are feasible and will be developed. Major emphasis should be given to models whose results can be communicated to those who must make decisions. Finally, a low risk high return strategy is practical. The reason is the powerful effect of controlling cash outflows or correspondingly increasing funding.

D. Don Ezra, Frank Russell Company, distributed a paper entitled *Risk Management in Pension Funds: The Past is Prologue.*

Ezra began by identifying five aspects of risk: what is risk? Whose risk is relevant? What causes risk? How is risk measured? What is the decision-maker's utility function? He identified four parties exposed to risk in the case of a defined benefit pension plan: employees, the corporation itself, the shareholders of the corporation, and the pension officer of the corporation sponsoring the plan. In the case of the corporate pension officer there is substantial potential for misunderstanding. The responsibilities of the pension officer are often not clearly enough defined, and they may be sufficiently confused with the responsibilities of the fund manager that psychological aspects of risk will dominate the true financial and investment aspects.

He identified two conditions for financial risk: there must be uncertainty as to outcome and there must be a mismatch between the exposure of assets and liabilities. Mismatch is an important element because it means that it is not appropriate to examine a portfolio alone in order to determine the risk to which the investor is subject. And a portfolio that offers low risk to one investor may offer high risk to another. He offered an example to illustrate the consequences of mismatching.

Consider a pension plan serving active employees, with benefits dependent upon those employees' salaries just prior to retirement. Salaries are expected to escalate at a rate that is the sum of inflation and real salary increase. The interest rate is the sum of two independent rates, inflation and the real interest rate. The available vehicles for funding pension liabilities are treasury bills, whose yields change instantly with changes in inflation, bonds and stocks, with the stocks priced according to a dividend discount model in which anticipated growth of dividends changes instantly with inflation.

In this simple model, the present value of liabilities is a function of three independent variables: inflation, the real interest rate and real salary escalation. Ezra then traced the consequences of variation in each of these three variables and deduced the appropriate method, if there is one available, of matching the asset to the liability and achieving immunization.

A change in the rate of inflation, if pensions are not indexed, will affect the present value of the liabilities over the post-retirement period. The appropriate matching asset will be a bond, with a duration probably of about five years since this is typically the duration of the post-retirement portion of pension fund liabilities. If the benefits are indexed, then the present value of the liabilities will be unaffected by a change in the rate of inflation, and the matching asset will be a treasury bill or an indexed bond or possibly common stock.

A change in the real interest rate will affect the present value of the liabilities over the entire discounting period, that is up to and following retirement. The matching asset will be a bond of about fifteen years duration or a high yielding stock.

Finally, a change in the real rate of salary escalation will affect the pre-retirement period, and there is no matching asset. There is, finally, no way to immunize against the consequences of changes in all three variables.

Ezra turned next to his question how is risk measured. Risk measured by standard deviation of return is generally not a very helpful concept in attempting to establish pension fund policies. Risk measured in terms of standard deviation of funded ratio is a little more useful. But risk measured in terms of probable required contributions, or probable net worth of the sponsor corporation is much more useful. It is easy to think in terms of a corporate goal of minimizing the cash that must be drawn from the business operations and contributed to the pension fund.
Identifying risk tolerance is particularly difficult. The difficulty stems in part from problems in communicating the consequences of different risk-return combinations, although a good deal of progress has been made on this. Further difficulty stems from the choice of an appropriate time horizon. The decision horizon is frequently different from the investment horizon. In theory, pension funds should have very long investment horizons, but as a practical matter the operating horizon may be fairly short.

Proclivity for risk-taking is an important factor. Ezra illustrated his conclusion that there is no necessary relation between the funded ratio of a pension plan and the risk tolerance of the corporate sponsor. Furthermore, he demonstrated that the sponsor's risk tolerance may not be constant. Finally, we do not yet have a methodology for relating funding ratio to the probability that liabilities will all be met.
SEcurities MArKets

71. A LAWYER'S RUMINATIONS ON
THE USE OF THEORY AND EVIDENCE
IN THE REGULATORY PROCESS
(Fall, 1990)

Edward Fleischman, Commissioner,
U.S. Securities & Exchange Commission,
delivered the opening address at the Fall, 1990
Seminar. His theme was the importance of
rigorous financial and economic analysis in
influencing decisions and policy making by the
Commission. He began by describing the
decision making process he had experienced as
a lawyer and then as a Commissioner, and the
way in which he sees the Commission going
about its business.

The agency method has four elements
to it. First, the agency's motivation must be
considered above reproach. Second, the
intuition of the agency leads unerringly to
appropriate conclusions, for which technical
arguments can be developed later. Third, the
role of the lawyers is to develop these
arguments. Fourth, any opposition to the
conclusions of the agency are not to be
tolerated, because opposition seeks to oppose
what is known to be right.

Fleischman saw these elements leading
to the conclusion that those who base decisions
on careful analysis rather than convictions, may
be more to be feared by an agency than those
who oppose its decisions on the basis of
differing convictions. Yet it is crucial, he
believes, to bring sound analytical work to bear
on SEC decisions.

He discussed briefly the work of the
Office of Economic Analysis within the SEC.
The OEA prepares a quarterly report, carries out
research on a variety of topics, does analysis on
rule proposals, and prepares analysis for
enforcement cases. To a large extent the work
of the OEA is removed from the mainstream of
Commission actions. But during the past
summer the OEA prepared a memo describing a
careful events study relevant to allegations of an
insider trading scheme. The study was prepared
for the Enforcement Division, rather than for the
Commission itself. But as it turned out the
events study was the only unambiguous piece
of evidence pertaining to the question whether
the cause of the decline in a particular stock price
had been the result of information releases.

Fleischman had brought the study to the
notice of his fellow Commissioners, in the hope
that they would recognize it as an example of a
valuable tool to aid in the decision making
process. He had been disappointed in the lack
of interest shown.

He gave a number of other examples of
cases where he believed the Commission had
formed strong opinions in the absence of sound
analytical evidence, including the position taken
with respect to proper regulation of the futures
market. It seemed to him that in too many cases
lawyers' intuitive beliefs and political agendas
simply fail to accord with conclusions reached
from sound empirical research.

He closed by urging the Seminar
participants to make themselves heard, and to
carry their methodologies to the Commission
and its staff.

72. SUNSHINE TRADING: THE
EFFECTS OF PREANNOUNCEMENT
ON TRADERS' WElFARe AND ON
PRICE VOLATILITy
(Fall, 1990)

Paul Pfleiderer, Associate Professor,
Graduate School of Business, Stanford
University distributed a paper by himself and
Anat R. Admati, entitled Sunshine Trading and
Financial Market Equilibrium. The paper
reported research supported by the IGRF.

Pfleiderer began with an introduction to
"Sunshine Trading" and the purpose of the
research. During the last decade, trading of
large blocks by institutional investors, and
various dynamic strategies have become
important elements in the marketplace. These
trades are generally based not on private but on
public information, and they make heavy liquidity
demands on the market. A number of proposals
have been made to increase liquidity in the
marketplace and perhaps reduce volatility at the
same time. One proposal involves sunshine
trading. Sunshine trading takes place when
traders in a financial market announce some
specified time before the submission of the
order, their intent to trade, and the number of
shares to be traded. In addition, the announcer
of the trade is contractually committed to carrying
it out. The purpose of the research was to
examine the effects of sunshine trading on the
market and on those participating in the market.
Pfeiferer identified three important types of traders: speculators, who trade on privately held information or analysis; market makers, who provide immediacy and liquidity; and liquidity traders, those who pursue portfolio strategies based on public information. The model of the financial market is a standard normal-exponential rational expectations model. Speculators choose their portfolio positions to maximize:

Expected return - 1/2(variance).

There is one risky asset and one riskless asset. The risky asset is purchased at a price $P$ in period 1 and pays off a random amount $F$ in period 2. It is assumed that there is an infinite number of speculators and market makers, leading to perfect competition. Prior to trading, the speculator $v$ observes the signal

$Y_v = F + e_v$

In addition to the speculators, there are two types of liquidity traders who trade in the market: announcers and non-announcers. The announcers have a total demand for the risky asset denoted $A$ with variance $a$. Those who announce their trading disclose the value of $A$ to the speculators before trading takes place, and they are required to trade precisely this number of shares in the subsequent trading period. The total demand of non-announcers is denoted by $N$ and its variance is denoted by $n$. The demands of non-announcers are never known to the speculators prior to trading.

The equilibrium conditions are:

Without

Preannouncement:

$\tilde{P} = \gamma_F + \gamma_A A + \gamma_N N$

$\gamma_F = \frac{s(a + n) + 1}{(s^2 + s)(a + n) + 1}$

$\gamma_A = \gamma_N = -\frac{ss(a + n) + 1}{(s^2 + s)(a + n) + 1}$

With

Preannouncement:

$\tilde{P}^* = \gamma_F^* + \gamma_A^* A + \gamma_N^* N$

$\gamma_F^* = \frac{sn + 1}{(s^2 + s)n + 1}$

$\gamma_A^* = \frac{s(sn + 1)}{(s^2 + s)n + 1}$

$\gamma_N^* = \frac{s^2 n}{(s^2 + s)n + 1}$

Four trading costs are identified: $C_N$ for non-announcers when there are no announcements made, $C_N^*$ for non-announcers when there is announcement, $C_A$ for announcers when none choose to announce, and $C_A^*$ for announcers when there is an announcement.

$C_N = E(\tilde{N}^*(\tilde{P} - F)) = E(\tilde{N}(\gamma_F^* + \gamma_A^* A + \gamma_N^* N - F))$

$C_N = \gamma_N n \quad C_A = \gamma_A a \quad C_N^* = \gamma_N^* n \quad C_A^* = \gamma_A^* a$

Pfeiferer summarized the conclusions as:

(a) The announcers strictly prefer to be able to preannounce.

(b) The non-announcers strictly prefer that no preannouncement take place.

(c) The total (ex ante) expected cost of trading for both types of liquidity traders is lower with preannouncement.

(d) Each speculator has a lower expected utility when preannouncement is possible.

In explaining the cost reduction, he pointed out that a security price is impacted by an order in two ways: the order may be information based in which case it presents a new risk, and there may be an adverse selection impact as well. Preannouncement eliminates the adverse selection impact and reduces the risk impact.

When the cost of entry to the market for speculators is $b$, and the fraction of speculators and market makers who enter the market is $\lambda$, and we assume there are only announcers, that is $N = 0$, then the market clearing price must be such that the demand of each speculator is equal to the supply - $A/\lambda$. The demand is

$\text{Demand} = E(F) - \frac{P}{\text{Var}(F)} = -P$

$P = A/\lambda$

Next, Pfeiferer explained the prediction of demand for liquidity:

Let $\lambda(a, b)$ be the equilibrium level of entry in the model without preannouncement as a function...
of $a$, the variance of $A$, and the cost of entry $b$. Then

$$
\lambda(a,b) = \begin{cases} 
\sqrt{a/(\exp(2b) - 1)} & \text{if } a \leq \exp(2b) - 1 \\
1 & \text{otherwise}
\end{cases}
$$

Let $\lambda^*(A,b)$ be the equilibrium level of entry as a function of preannounced liquidity demand $A$ and the trading cost $b$. Then

$$
\lambda^*(A,b) = \begin{cases} 
(2b)^{-1/2}|A| & \text{if } |A|^2 \leq 2b \\
1 & \text{otherwise}
\end{cases}
$$

Trading costs of announcers are very important, since traders will announce only if it is in their interest to do so. If the cost of entry is very low, then there should be plenty of liquidity in the market and preannouncement may not be attractive, if the preannounced trading is itself quite small and therefore discouraging to those who might be prepared to make a market. In other words, preannouncement may actually reduce the extent of liquidity available in the market. For higher costs of entry, there is less likely to be plenty of liquidity available in the market at all times, and preannouncement is more likely to increase liquidity. Pfleiderer was unable to identify at what particular entry cost preannouncement would become attractive, but he doubted that actual entry costs are below this crossover point.

In summarizing his results, Pfleiderer emphasized the two effects of sunshine trading: the information effect and the entry effect.

- Announcers always gain through information effect, generally gain through entry effect
- Nonannouncers always lose through information effect, can gain through entry effect
- Speculators/market makers always lose through information effect and always gain through entry effect
- Sunshine trading makes prices more informative
- Volatility of prices can either rise or fall with introduction of sunshine trading

He concluded with the observation that sunshine trading is a very complex subject, and that although his analysis had led to a number of interesting conclusions, some ambiguities remained and although sunshine trading is probably beneficial to the marketplace one cannot be entirely sure.

73. ARE THE TRADITIONAL VIEWS STILL VALID? (Spring, 1988)

Andrew Rudd, President and CEO, BARRA, distributed a brief paper entitled, Are Traditional Views Still Valid? The Crash of October 1987. Rudd's thesis was essentially that the events of October 19, 1987 were consistent with a traditional view of what makes stock returns. The multiple factor model explains stock returns in terms of a series of factors and exposures of a particular portfolio to each of these factors. Alternative approaches explain expected returns in terms of systematic and residual risk, or establish a benchmark portfolio and consider active management in relation to this benchmark.

Maintaining confidence in these traditional approaches requires that they offer an explanatory power for returns that is substantial and constant over time. Factors and specific return distributions must be stationary. And in decomposing performance we must be able to put meaningful names to factors or other attributes. The question then is whether these conditions were maintained through the market drop on October 19.

Rudd presented a table showing large daily moves in the S&P 500 index from 1973 through 1987. While the extent of large moves has varied over the years, it is clear that 1987 stands out, and that October stands out in 1987. We have some indication then that October 1987 was an extraordinarily month. Volatility statistics bear out this observation. Daily volatility in October 1987 was 5.87%, corresponding to about 90% annually. If we exclude October 19, daily volatility for the month was only 3.9%, still a large number. The next highest monthly volatility was 2.02% for October 1974, and the next highest was 1.98% in September 1974.
But some other statistics were not at all unusual in October 1987. The performance of 10 portfolios ranked by beta coefficient was just about what one would have expected. That is, given the decline in the market as a whole, one could have predicted accurately what would happen to portfolios with betas ranging from about .50 to 1.50. Beta would still have been an effective measure of relative risk control, although of course at any level of beta the losses would have been surprising.

Residual industry and common factor returns were large, but again not extraordinary, in October 1987. The most unusual residual industry return was for electric utilities, up 12.2%.

Among common factors, the residual returns for size and for variability in markets were unusually large, but most of the others were not. Rudd concluded at this point that although the market decline was quite extraordinary, beta coefficients continued to work well, industry returns were not very much out of line, nor were factor returns. All of this lends support to the proposition that the traditional ways of explaining portfolio returns remained valid through the sharp market break.

Rudd continued with a discussion of the implications of the events of October 19 for fund management. His first conclusion was that for investors who have reasonably long time horizons (at least longer than one month) and do not need to trade at a particular time and at a particular price in particular volume, the October decline is not very important. For investors, on the other hand, who are depending upon mechanical trading rules (as in the case of portfolio insurance) that require trading in size at a particular price at a particular time (which means requiring that appropriate pricing relationships hold at these critical times) the experience of October 19 suggests some very serious risks that may not have been adequately anticipated.

The apparent disappearance of liquidity on October 19, and its consequence for those who had to trade, may seem an extraordinary event. But Rudd provided some other examples of extraordinary short term market declines accompanied by the disappearance of liquidity. One was for the price of oil in January 1986; another was for the price of silver in May 1987, and a third was for the price of copper in January 1988.

In summary, on October 19, 1987, the action was in the market as a whole, rather than in components of the market.

Some participants wondered whether it might not be appropriate to perform some research on the rise in the market in 1987, rather than to focus all of our attention on the decline on October 19.

74. THE BRADY REPORT: FINDINGS AND IMPLICATIONS (Spring, 1988)

Gilbert Beebower, Executive Vice President, S.E.I., was a member of the Professional Staff of the Brady Commission. He offered comments on some of the work of the Commission and its conclusions and recommendations.

A number of those involved in the Brady Commission Report appeared convinced that the task was to find the person or thing responsible for the steep market rise during the early part of 1987 and the sharp decline in October. Some felt that portfolio insurance must be the villain; others attributed the entire rise and fall to the activities of a large mutual fund complex.

While the final report endorses index arbitrage trading, not all of the appointees supported this position. Some believed that the existence of the futures market should be challenged. In the end, some of the appointees concluded that there were indeed responsible villains, others concluded that no explanation was apparent.

Beebower felt that the report contained one major recommendation, to the effect that a single federal agency should coordinate activity across market systems. However, a degree of competition among regulatory agencies, as in the case of the SEC and the CFTC, probably enhances the competitiveness and integrity of the markets. One must suspect that if the SEC had had complete control there would be no index futures markets. The Federal Reserve seems to be the prime candidate as the coordinator for all markets, and the fact that the Board appears to have no interest in this task might recommend it. Presumably, it would play a minimal role.

The recommendation with respect to "circuit breakers" has been widely misunderstood. It was not intended as calling for
halts to trading at arbitrary cutoff points. The objective was to close the market when the market system breaks down, not just when extraordinary price changes take place. When market participants cannot obtain good price quotes, and simply cannot trust the system, then we have a special problem. It appears that many participants who might have been purchasers on October 19, held back because they had no confidence in the market mechanism. It would be helpful, therefore, to have some prearranged rules offering assurance that when the system is overloaded it will be closed down until proper functioning can be resumed.

75. PANEL: DEBATING THE FINDINGS (Spring, 1988)

Andrew L. Turner, Vice President, Frank Russell Company, referred to prior presentations on the 1987 market crash and asked the panelists to identify the single best recommendation for enabling markets to handle trades under difficult conditions and the single worst recommendation.

R. Sheldon Johnson, Managing Director, Morgan Stanley & Co. Inc., discussed the changing market environment, and needs for liquidity. Liquidity needs have risen with the concentration of market assets in fewer institutional portfolios, with increased internationalization of portfolios, and with a greater use of information and asset allocation strategies. At the same time, liquidity has been improving. Reliance on the specialist gave way to block trading; swaps improved on block trading, and derivative securities have added still more liquidity.

Of the recommendations by the Brady Commission, he felt that unifying clearing mechanisms is especially important. It is not crucial that we have a single clearing agency, but we do need coordination and assurance of good funds. He was generally in support of some circuit breaker mechanisms, to slow trading at times. Halting DOT orders did not seem an attractive way to deal with the problem.

Jeffrey A. Geller, Senior Vice President, BEA Associations said that portfolio insurance has probably been oversold. The product may have some flaws in it and if this is the case, the market will respond appropriately.

But, he said, we cannot ignore dynamic trading strategies so long as investors wish to achieve certain payoff patterns that require these strategies. His opinion was that the failure of liquidity on October 19 was a failure of market mechanics rather than the fault of portfolio insurance. The best recommendation is for the specialist to announce publicly the order imbalance on the specialist book. The worst recommendation involves limits for index arbitrage.

Sanford Grossman, and Gilbert Beebower both suggested that the single worst recommendation that has been made is a circuit breaker based on price movements.

76. FINANCIAL MARKETS (Fall, 1987)

Donald E. Weeden, President and CEO of Weeden & Co., delivered the opening address at the Fall 1987 Seminar. His subject was the transition of the financial markets from around the end of the Second World War, when the New York Stock Exchange played a dominant and controlling role, to the present. Weeden himself had played a significant part in the transition from the 1960's through the mid 1970's.

During the decade following the close of World War II the New York Stock Exchange clearly dominated the equity market in the United States. Technology was rather simple, with the ticker tape and the teletype the devices used for communication and disclosure. Pension funds were beginning to emerge as important market participants, and attention was shifting from bonds to equities. Weeden was during these years a non-member dealer, making markets mostly in bond and preferred stocks, but discovering an increasing institutional interest in listed common stocks. The firm began to make markets in some of these stocks off the exchange, and so the third market was born. Most of the customers were actually members of the New York Stock Exchange dissatisfied with the ability or willingness of exchange specialists to handle rising volume.

Weeden next identified two major events. One was the Special Study of the Securities and Exchange Commission, which constituted the first serious SEC study of financial markets since 1934. The second event was the Silver case. Silver was a non-member broker dealer whose direct lines and ticker connection to the New York Stock Exchange were cut off. His cause was vindicated by the Supreme Court, which declared that the New
York Stock Exchange was subject to antitrust laws.

The Silver decision was a major blow to the position of the New York Stock Exchange, but other developments were working at the same time towards breaking the stock exchange monopoly. The specialists on the exchange were proving incapable of handling large block trading. The ticker frequently ran so far behind trading that third market firms could provide better quotes than could member firms. The NASD market was becoming more active, and electronic innovation was spurring competition to the exchange market. The SEC concern with fixed commission rates finally resulted in their elimination in 1975.

What emerged from all of these developments, Weeden said, is a market ready for the innovations that are taking place today. The stock market that was once considered a geographical concept has become a communications concept. The regulatory process has adapted to this change in concept so that the old barriers to competition and innovation are gone. His closing comment was that nothing now stands in the way of improvement and expansion of financial markets.

77. PANEL DISCUSSION: THE CHANGING MARKETPLACE (Fall, 1987)

Kamal Duggirala, Director of Equity Services at BARRA, discussed electronic crossing networks. Electronic crossing consists of the offsetting of institutional buy and sell orders. Institutions communicate their orders to an electronic system, and are able to view orders that have been placed by other institutions. Normally, the orders are to be executed at the close for the day, although another close can be stipulated. The system is something akin to a bulletin board on which institutions display their buying and selling plans.

The origin of electronic crossing lies in the activities of index funds which some time ago developed a network enabling them to trade with each other after the market close. Their trading, of course, was not informational trading, and it was natural for a third party to wish to provide order matching services. Index funds now deal with brokers after the market close, and ask for a guarantee of a price at or close to the closing price.

Duggirala stressed that the problem encountered when traditional market makers attempt to deal with very large buy and sell orders is that the very magnitude of the orders has a major impact on the price the market maker is willing to quote. Electronic crossing attempts to eliminate the price effect of an imbalance of buy and sell orders.

R. Steven Wunsch, Vice President of Kidder, Peabody & Company, began with some observations on increased volatility in the marketplace, which he attributes to the manner in which markets are made. He produced some statistics supporting the proposition that volatility has risen in recent years and that perceptions of quite high volatilities can be found in the prices of S & P 500 index options.

He suggested some benefits from avoiding unnecessary market making, and put forward a proposal for a single price auction. A crossing system would collect buy and sell limit orders, and quickly establish the single price that would clear the market, while an imbalance between buy and sell orders would be revealed to market participants, which would probably lead to new orders eliminating the imbalance.

James C. French, Senior Vice President of Wellington Management, discussed the situation facing a trading department today. A variety of devices and trading arrangements are available to aid institutions. Wellington does not do package trading, but it may be useful to some. Fourth market trading, electronic crossing, and INSTINET are all helpful. In particular, the fourth market is an important source of liquidity. INSTINET began as a "black box", essentially an electronic book, but has now become a useful link among market makers. French did express some concern over the fragmentation of markets and recalled the days when the New York Stock Exchange was the only market.
78. PROBLEMS AND SOME SOLUTIONS FOR MEAN VARIANCE OPTIMIZERS (Fall, 1988)

Richard O. Michaud, Vice President and Manager Equity Analytics, Merrill Lynch Capital Markets, distributed a paper entitled The Markowitz Optimization Enigma: Is Optimized Optimal? The Markowitz mean-variance efficient portfolio model is a major, and perhaps the most important, pillar of modern portfolio theory. It has given us an understanding of diversification and led to the Capital Asset Pricing Model. It may therefore seem puzzling that the model is little used by the investment community. This is particularly so in view of some of the obvious potential practical benefits of the Markowitz model. The model is convenient. It allows for control of portfolio exposure to different components of risk. It can reflect an investment organization's style, philosophy, and market outlook. It is designed to use information optimally in a total portfolio context. And it is capable of processing very large amounts of information quickly.

Michaud outlined some of the reasons for not using the Markowitz model. Probably the most important has to do with organizational politics. Effective use of the optimizing model requires important changes in the structure of the investment organization and management of the investment process. The optimizer may indeed replace much of the activity of an investment policy committee. A second important obstacle lies in the likelihood that optimized portfolios will be unintuitive, and simply not appear sensible to those responsible for the portfolio decision. Michaud had set out to explore the question whether the optimized portfolios are indeed superior, even though managers find them difficult to accept, or whether they are difficult to accept because they really are not superior. He suggested six fundamental limitations of mean-variance optimizing models.

The first is error maximization. The risk and return estimates that must be supplied to the model are always subject to estimation error. Unfortunately, the mean-variance optimization significantly overweight and underweights securities as a result of large estimation errors in the data for those securities. Michaud referred to the work of Jobson and Korkie, in quantifying the magnitude of the error maximization characteristics of mean-variance optimizers. The results can only be described as highly discouraging to those who make use of the models.

A second, and somewhat related limitation of the model also has to do with data supplied. Using sample means to estimate expected returns is widely practiced but is not satisfactory.

A third limitation lies in the possibility of missing factors. Liquidity, in particular, is a factor important to many investment managers, but not a part of the mean-variance optimizer.

Fourth, optimizers do not differentiate between the quality of different input data. Risk estimates are often more reliable than return estimates.

Mean-variance optimization requires the inversion of a covariance matrix, which makes some optimizations highly unstable, so that small changes in the input assumptions can lead to very large changes in the composition of the optimized portfolio.

Finally, mean-variance optimized portfolios are not unique. Different portfolios may be widely different in their stock composition but still be mean-variance efficient.

There are actually two kinds of mean-variance optimizing models. The Markowitz model depends upon parametric quadratic programming. But most commercial optimizers only approximate the Markowitz model. The approximations have two benefits. They can more easily deal with very large sets of data, and they can more easily accommodate constraints imposed by the user of the model. Some users are convinced that the approximations are better than the true model, largely because they lead to more intuitively appealing results. Michaud suggested that the approximations may appear superior simply because they more effectively conceal the difficulties he had identified in the true model. Some participants observed that these approximate models are often in fact used simply to add apparent confirmation to portfolios that had already been chosen.

Michaud had three proposals for enhancement of the Markowitz optimization procedure. First is the use of a benchmark.
Mean-variance efficiency is defined in terms of performance with respect to a benchmark index or liability. The input parameters are redefined to reflect residual returns with respect to the benchmark.

A second proposal involves the use of Bayes-Stein estimators for expected returns. Some testing reported by others suggests that this can result in significant improvement in the practicality of mean-variance optimization.

Finally, adjusting input data on the basis of its reliability, using the information coefficients devised by Keith Ambachtsheer offers another potential for improvement.

Michaud turned next to some alternatives to the mean-variance optimizing model. Alternatives are suggested by the ambiguity of the Markowitz model. That is, a number of portfolios with quite different compositions are found to be efficient. This means that there is a good chance of discovering an intuitively appealing portfolio that is efficient, perhaps using a method quite different from the Markowitz model.

Linear programming may be an attractive alternative. Maximization of expected return will be achieved subject to various linear constraints. Whether this technique is better than using the Bayes-Stein estimators in a carefully controlled quadratic optimizer is something Michaud was unable to decide.

A second alternative consists of taking an intuitively appealing portfolio and testing for its mean-variance efficiency. If the portfolio falls within a confidence region encompassing statistically equivalent portfolios on the efficient frontier, then the proposed portfolio is acceptable. Unfortunately, the tests that are available today do not have much power.

Michaud turned finally to some examples and applications of mean-variance optimizing, discussing index or tracking funds, tilted index funds, asset allocation, and active portfolio optimization. In conclusion, he went back to his original question: Is mean-variance optimization an optimal method of forming portfolios? His answer was: probably not often, and certainly not unless the model is carefully controlled. The mean-variance algorithm is simply too powerful for the level of information inputs.

79. PANEL DISCUSSION: QUO VADIS?
(Fall, 1986)

William F. Sharpe, Sharpe-Russell Research, Inc., moderated a panel made up of those who had already made presentations at this Fall 1986 Seminar.

Sharpe began the session with a brief discussion of the process by which portfolios are put together. He pointed out that the standard theoretical approach almost always says that one should examine all available securities and from their characteristics determine an optimal portfolio, all in one process. As a practical matter, however, portfolios are never assembled in this way. The process generally begins with security analysts researching individual securities. Other investment professionals take the work of the security analysts and form groups or universes of securities. Still other professionals select from these groups the securities thought to be appropriate for a particular investor’s portfolio. And indeed there may be many more stages in the entire process. Sharpe argued that there are good reasons for the actual process, and its difference from the theoretical process. What we are dealing with is essentially a problem in information economics, and Sharpe suggested that some further research on this topic is called for.

Some of the valuation and portfolio techniques that have been developed to deal with securities may lend themselves better to asset allocation among classes of securities. We know that means and covariances are difficult to deal with at the level of the individual security, but they have proved considerably more tractable at the level of a class of securities.

Continuing with his theme of separating the stages of the investment process and matching each to the most appropriate methodology, he contrasted the arbitrage valuation method with utility theory. Arbitrage models are excellent for identifying mispriced securities. But at the other end of the process is matching portfolios to the particular needs of investors, and it is here that client utility seems crucial.

Following remarks by Russell Fogler at an earlier session (see summary #70), Sharpe agreed that educating portfolio owners with respect to risk is an important future task. Simulation models seem to be a useful approach, but we need some better ways of
making clear to clients the probabilistic results of investment strategies.

Sharpe next considered problems peculiar to pension fund investing. Although ERISA declares that the interests of pension fund beneficiaries must be placed before all others, pension fund management must take account of other interested parties, including the Pension Benefit Guaranty Corporation, the IRS, the pension committee of the sponsor corporation, the corporation itself, and its shareholders. (One participant suggested that the managers of the pension fund are also important interested parties.) It is not really clear what objective function is being maximized in the management of pension funds. And this is an issue worth addressing.

Sharpe suggested that it is time to devote more attention to pension plan liabilities. Sponsors have got to be dealing with the issue of inflation, and reach some conclusion as to what level of benefits is really being promised, or at least held out as an expectation for employees and plan beneficiaries. He suggested that more study of labor economics might be useful in improving an understanding of the liability structure of a pension plan.

In concluding his opening remarks, he thought it useful to distinguish three kinds of asset allocation, and perhaps clarify the elements of each. Strategic asset allocation is based upon long-run judgments with respect to capital markets, and involves the setting of long-run policy. Simulations are generally used as an aid in setting this policy. Dynamic asset allocation is based more upon utility than on forecasts of market behavior. Examples of dynamic allocation are contingent immunization and portfolio insurance. These represent responses to changes in risk tolerance of portfolio owners. Option based models are helpful in establishing this kind of asset allocation. Finally, tactical asset allocation (essentially market timing) is based upon short-run predictions of deviations from long-run expected market behavior. Some sort of optimizing model is likely to be used here.

Russell Fogler joined the discussion to argue that managers need to improve ways of conveying to clients an understanding of investment risk. And he identified as particularly important the distinction between real and nominal risk. Mark Rubinstein commented that probably the only available inflation hedge is short treasury bills, which over long periods of time have tracked inflation very closely, although recently the tracking has not been at all close. A discussion of portfolio insurance followed, with some arguments that insurance is justified only if the market is truly rational, and is probably not justified if one can argue that significant downward moves are probably overreactions.

Returning to the inflation issue, Don Ezra suggested that a problem is created if one insists that pension liabilities adjust for inflation. It is possible that the capital markets simply cannot support the liability structure that has been created.

Time horizons for decision making were also discussed. With respect to asset allocation decisions, which are the sponsor's responsibility, judgments probably require a very long time horizon. Validation of factor bets probably requires a somewhat shorter horizon, and one can judge individual security selections over a quite short period. There was some discussion of benchmark portfolios, and Robert Schultz indicated that only slow progress has been made so far. Managers are still reluctant to be measured against a market sector.

There was a further discussion of the difference between judging a manager against an appropriate benchmark and judging that manager against a broad index. David Seidel pointed out that a manager who can expect to offer only a modest incremental return over a narrow benchmark index is not likely to welcome comparisons to that benchmark. Russell Fogler conceded that beating a narrow benchmark by 1 percent may be a reasonable accomplishment, and he would try to impress the plan sponsor with the importance of a small marginal increment. But he agreed that the manager will probably be judged against a broad market index and one reason for this is that the pension officer of the sponsor corporation is probably being held to a broad market index.

Another issue had to do with broad diversification of pension funds, leading to little reason for expectations of rates much different from the market rate of return, and a narrower focus that could produce significant extra returns. Robert Schultz said that large pension funds are tending to reduce the number of managers employed, and focus their efforts somewhat. IBM is tending towards more concentration. He added the thought that most
plan sponsors are competing with other plan sponsors for the best ideas of their managers.

80. PANEL DISCUSSION: MARKET INDICES IN THE ASSET ALLOCATION FRAMEWORK (Spring, 1986)

Robert E. Shultz, Director of U.S. Retirement Funds, IBM Corporation, introduced the panel. David A. Seidel, Vice President, Pension Fund Management, GTE Investment Management Corp., discussed asset allocation at GTE, and the use of market indices in establishing the parameters for asset allocation.

He described the use of an optimization model for a 5-year plan at GTE. The company used market indices for this model, but wondered whether using the experience of GTE with its own portfolios might lead to significantly different results. He began by running a control asset allocation, using standard deviations and correlations taken from GTE experience rather than the standard deviations and correlations provided by First Chicago Investment Advisors, based on indices. The following table shows the expected returns used in the optimization, together with the standard deviations from the two sources.

<table>
<thead>
<tr>
<th></th>
<th>Using Indices</th>
<th>Using GTE Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Portfolio</td>
<td>11.4%</td>
<td>13.3%</td>
</tr>
<tr>
<td>Optimized-Max Rate of Return</td>
<td>11.4%</td>
<td>13.5%</td>
</tr>
<tr>
<td>Optimized-Min Standard Deviation</td>
<td>10.8%</td>
<td>13.3%</td>
</tr>
</tbody>
</table>

The characteristics of the optimized portfolio are also shown, first for the case where expected return is maximized for the current standard deviation, and second where the standard deviation is minimized for the current expected return. The optimized portfolios themselves were not very different, for the case where indices were used and the case where GTE data were used. This seemed surprising to Seidel and to some participants, but Seidel explained it on the grounds that for the assets where the historical GTE record differed significantly from the index record the limits on allocation were met in both cases. That is, whether the indices or the GTE data were used, the optimized portfolios went to the 4 percent limit on venture capital and the 6 percent limit on real estate.

In conclusion, Seidel expressed satisfaction with the existing indices as a basis for optimization.

Thomas M. Richards, Principal, Richards and Tierney, Inc., stressed the importance of satisfactory benchmark portfolios in implementing an allocation policy. Once the asset allocations have been made, and a decision has been made to adopt an active as opposed to a passive strategy, then superior managers must be selected and their performances must be monitored. For both the selection and the monitoring it is essential to make use of good benchmark portfolios. And there is another use for the benchmark portfolios: to control allocations of funds to managers.

Richards presented data for a situation in which there had been poor diversification of assets among managers within an asset category. He observed that the benchmarks for the individual managers should add up to the appropriate market index for the asset category, and in his example this was not the case. The end result was an appearance that managers had
done poorly, since in the aggregate the managers had underperformed the market index for the asset category. But a closer inspection revealed that the managers had done very well with respect to their own individual benchmarks. It was the benchmarks that had not performed well, that had in fact as a group underperformed the index. So the fault lay with the allocations of the sponsor among the managers, not with the managers themselves.

By selecting the indices and the benchmarks appropriately, it is possible to identify the responsibility of the managers and the responsibility of the sponsors for superior or inferior performance.

Marvin Damsm, Third Deputy Comptroller, City of New York, discussed the reorganization of the management of the fixed income component of New York City's retirement funds. In contrasting what plan sponsors should be doing with what he perceives them to be doing, Damsm identified the steps to be followed for the $13 billion bond component and $4.7 billion cash component of the retirement system. First, the principal focus would be on aggregate performance of the entire portfolio. Second, the bond market would be divided into subsectors, with guidelines and controls, making use of indices, for each. Managers would be assigned to specific subsections and would be monitored against guidelines and benchmarks for those subsections. Finally, the guidelines themselves would be adjusted from time to time.

For the overall portfolio, the Shearson Lehman Aggregate Index was chosen as a benchmark. Four subsectors were selected, for government, corporate, foreign, and mortgage backed securities. Duration parameters were established for each subsector and for components within those subsectors.

Damsma's conclusion was that the new system puts the sponsor in direct control of the aggregate portfolio, rather than making the aggregate results depend upon the individual managers. The sponsor can tailor the aggregate to meet its goals, through varying the subsector weights and changing the manager control parameters. Customized performance standards make for easy monitoring and communication. They also provide a basis for a fulcrum incentive fee structure. Finally, they focus the attention of the manager on the appropriate benchmark rather than on the performances of other managers. He believes the new structure promotes better relations between the sponsor and the manager. It reorients the sponsor and trustee to manage money not managers. Damsm believe that the restructuring of the fixed income component will serve as a model for the other asset categories.

81. INVESTMENT RULES, PORTFOLIO INSURANCE AND THE IMPLICATIONS OF FINANCIAL CYCLES (THE ERGODIC HYPOTHESIS)
(Spring, 1986)

Michael R. Granito, Managing Director, J.P. Morgan Investment Management, Inc., demonstrated that a number of rather simple linear asset allocation models are actually good approximations of mean-variance optimization models, and work quite well under certain conditions (the ergodic conditions).

He described a linear asset allocation rule as following this form:

\[ P = N \times \text{factor } Y \]

Where \( P \) is the percent of the portfolio invested in a risky asset, \( N \) is the "normal" percentage invested in the risky asset, and \( Y \) is a value indicator. A specific example, for determining the portion of a bond portfolio to invest in 20-year zero coupon treasuries, might be:

\[ P = 25\% \times (Y - 8\%) \]

Where \( Y \) is the yield on the zero coupon bonds, and 8 percent is taken as the long-run average yield on these bonds. Granito produced a number of analogous expressions for different kinds of portfolios. The common element was that the value indicator was always a measure of abnormality, or deviation from the "neutral" case.

Granito's question at this point was whether these simple linear rules are optimal in a mean-variance sense. He established an allocation formula based upon mean-variance optimization, and showed that this formula is very similar to the linear formulas he had examined. In explaining the similarity, he expanded his linear formulation to the following:

\[ \text{Portfolio Return} = \text{Neutral Portfolio Return} + \text{Error Term} + \text{Volatility Term} \]

The volatility term represents the average value of the volatility of changes in the value indicator, and this will always be positive. The error term
can be positive or negative. Over the long run it will tend to zero, although just what constitutes the "long run" is a matter of some importance. Over the long run then the return on the portfolio will be the neutral return plus the volatility return, for the simple linear asset allocation models Granito had identified.

Shifting the linear model to a closer approximation of mean-variance optimization, Granito suggested the following, for choosing between long bonds and cash:

\[ D_p = D_n + \text{factor} \times (Y - 8\%) \]

where \( D_p \) = duration of portfolio
\( D_n \) = neutral duration
\( Y \) = yield on long bonds

This formulation can be converted to the following:

\[ R_p = R_n + \text{factor} \times \frac{\text{forecast error} \times \text{actual change in } Y}{\text{time horizon}} \]

\[ + \text{factor} \times \text{volatility in } Y \]

The error term can be positive or negative, but will tend to go to zero as the horizon lengthens. What is critical is that long bond yields fluctuate in a normal range. In this case, the cumulative error will never become very large, and as the horizon is lengthened the error divided by the horizon will become smaller and smaller and tend towards zero. At this point Granito was introducing the ergodic element, which can be thought of as history repeating itself or a tendency to revert to the mean. Should the yield on long bonds, for example, continue to rise or to fall indefinitely, so that the cumulative error is constantly increasing, then we no longer have an optimizing method in the simple linear allocation model.

Granito presented some payoff diagrams, showing that the payoff pattern for the linear allocation model is very similar to the payoff pattern for one who sells portfolio insurance. In essence, the investor who is able to work with a long time horizon, and need not be concerned with intermediate results, is in a position to exploit this ability either by following a linear allocation model of the form described by Granito or by selling portfolio insurance to investors who cannot ignore short-term fluctuations in value.

Granito next showed some empirical results for a strategy involving cash and the Shearson/Lehman Bond Index, from November, 1977, through June, 1985. For time horizons ranging from one to seven years, he had tabulated the number of instances in which a simple linear allocation model had beaten the index. And the tabulations had been done for three separate uses of the model. In one, the estimate of the long-run average rate on the index had been correctly chosen to match the actual average over the 1977-1985 time period. In a second case, the average had been consistently overestimated and in a third case the average had been consistently underestimated. It turned out that in all three cases the allocation model had outperformed the index most of the time. And for the longer time horizons, it had outperformed the index 95 to 100 percent of the time. In other words, despite the inaccurate forecasts of the average long-run return on the index, the positive effects of the volatility term had far outweighed any negative effects of the error term.

It was pointed out by participants, and Granito agreed, that the choice of time period was important. Rates on the index had gone through a cycle over this period, rather than establishing an up or down trend.

In explaining the success of the model, Granito pointed out that holding a fixed allocation between long bonds and cash is equivalent to adjusting duration of the portfolio to rise when yields fall and to fall when yields rise. This is just the opposite of what was achieved by his allocation model, and would be equivalent to buying, rather than selling, portfolio insurance.

In closing, on the subject of the ergodic property and the ergodic hypothesis, Granito described the ergodic property as fluctuation in a normal range, or repetition of history or reversion to a mean. The ergodic hypothesis that is of interest to us is that many important securities markets have the ergodic property.

82. NEW PERSPECTIVE ON ASSET ALLOCATION (Spring, 1986)

Martin Leibowitz, Managing Director, Salomon Brothers, Inc., approached asset allocation by way of total portfolio duration. He began with a report on his exploration of the duration of equity investments. Durations of bonds, bond portfolios, and bond indices are relatively easy to establish. It turns out that stock
returns are sufficiently well correlated with bond returns, that it seems reasonable to estimate the duration of a stock index from the duration of a bond index. The correlation between the returns on the S & P 500 Stock Index and the Salomon Brothers Bond Index averaged about 0.34 from 1961 through 1986, although it showed a substantial variation from less than 0 to about 0.80. Leibowitz regressed the S & P 500 return on yields for ten year treasury bonds, to derive a duration of about two and a half years for the stock index. Regressions using different interest rate series produced slightly different results, but all lay in the range of two to three years. Further research making use of sectors within the S & P 500 led to some variety in durations, but none were much above three.

In contrast, the dividend discount model, through calculation of the derivative of price to discount rate, tells us that duration is $1/(k - g)$, where $k$ is the discount rate and $g$ the growth rate. This formula suggests a duration of about twenty years for the S & P 500 Index. The discrepancy, then, between the duration for stocks derived from bond durations and the duration derived from the dividend discount model, is very substantial. In seeking an explanation, Leibowitz suggested what he called "inflation flow through". The duration given by the dividend discount model may in fact be attenuated by the derivative of growth with respect to discount rate. And through what he called "growth equilibration" over an interest rate cycle, Leibowitz provided a plausible explanation for growth rate tracking the discount rate, with some delay, such that the derivative of growth rate with respect to discount rate may well explain the previously identified discrepancy in durations.

Now Leibowitz was ready to move to total portfolio duration, which is a weighted average of the durations of the portfolio components, including bonds and equities. Next he considered, for a retirement fund, the duration of the pension liabilities. Working with a schedule of liabilities for retired employees and a schedule for liabilities for active employees, he was able to arrive at a duration for all of the liabilities, in his example about twelve years. He was now in a position to compare the sensitivity of the value of the total portfolio to changes in interest rates with the sensitivity of the value of the liabilities to the same changes. Here he introduced the surplus, which is simply the difference between the value of the total portfolio and the value of the liabilities.

Immunization would call for matching the duration of the total portfolio to the duration of the liabilities. This would preserve the surplus over changes in interest rates. What Leibowitz believed he had observed, however, was a significant mismatching of durations in practice, that had in fact led over the past five years to a substantial shift from a surplus to a deficit position, as interest rates have fallen. This was the consequence of liabilities having a considerably longer duration than total pension plan assets. The decline in interest rates raised the value of the liabilities much faster than it raised the value of the assets.

One implication of what he had reported was that the duration of retirement plan portfolios should be higher. However, this was not the chief point Leibowitz wished to make, and in fact a number of participants pointed out that treating pension liabilities as fixed in dollar amounts may create an erroneous picture of the true sensitivity of liabilities to interest rate changes.

Leibowitz's principal point was that asset allocation is too often limited to the decision how much to put in each asset category, in most cases focusing upon equity and bond allocations, while the decision should incorporate another step, namely choosing a duration for the bond portfolio to bring about an appropriate duration for the total portfolio.
83. STOCK PRICES AND VOLUME
(Fall, 1990)

Peter E. Rossi, Associate Professor, Graduate School of Business, University of Chicago distributed a paper entitled *Stock Prices and Volume* by himself, A. Ronald Gallant, and George Tauchen. In discussing the reasons why it had seemed worthwhile to model the relationship between price and volume, he referred to a number of studies on the relationship between price movements and volatility, some work on the contemporaneous relationship between price change and volume, and some recent suggestions that volatility might be reduced by reducing trading volume. The particular purpose of the present paper was to undertake an empirical investigation of the dynamic relationships among price and volume movements in the stock market.

The research had four objectives. The first was to analyze the relationships between contemporaneous volume and volatility. The second was to characterize the intertemporal relationships among prices, volatility, and volume. The third was to examine the "leverage effect", that is the asymmetrical effect of positive and negative price changes on volatility, and the extent to which conditioning on past volume reduces or increases the asymmetry. The fourth objective was to determine what, if any, relationship there is between the conditional mean and variances of price changes.

The raw data consisted of the daily closing values of the Standard & Poor's 500 Index and the daily volume of shares traded on the New York Stock Exchange, for the period 1928-1987. The price index series was differenced in the logs to create the price movement series. The volatility of the raw price change series produced a U-shaped pattern, since in the early 30s and late 80s the volatility was relatively high, while in the middle part of the sample the volatility was low. In addition, a number of studies have found systematic calendar effects on both the mean and variance of price movements. In order to adjust for documented shifts in both the mean and variance of the price and volume series, the authors performed a two-stage adjustment process in which systematic effects were removed first from the mean and then from the variance.

Two methodologies were used. The seminonparametric method was the one relied on primarily, and the kernel method was used to corroborate the SNP estimates.

The contemporaneous relationships between price movements and volume that others have found were revealed in this research. It did turn out that the direction of the daily change in the stock market is unrelated to contemporaneous volume. The market is as likely to fall or rise on heavy volume as it is on light volume. On the other hand, volatility was found to be related to contemporaneous volume. Days with high volume are associated with high price volatility.

An examination of the conditional moment structure of the price change series indicated only a very modest amount of predictability in that series.

An interesting finding was that while the effect of price change on volatility was asymmetric, introducing volume into the analysis produced a symmetrical effect. What seems to happen is that the result of introducing volume into the analysis is a down weighting of extreme observations.

To describe the dynamic relationship between volume and price changes, a series of regressions were performed in which lagged volume variables were added to the one step-ahead predictors of the conditional mean and variance of the price series. Three conclusions emerged from the regressions: (1) there is a great deal of noise in daily data; (2) volatility is surprisingly predictable; and (3) volume contributes slightly to the prediction of both the mean and the variance of the price change series.

Finally, the authors investigated the relationship between the conditional mean and variance of the price change series. Other research, not including a volume variable, had found a negative relationship between the conditional standard deviation and the mean. The authors in this case also found negative relationships, but when the volume variable was included, there was always a positive conditional mean-variance relationship.
The presentation closed with the observation that an interesting theoretical challenge is to develop a complete equilibrium model that can jointly account for all of the characteristics uncovered in the course of this research.

84. DIVIDEND YIELD AND EFFICIENT FRONTIERS (Fall, 1990)

John S. Brush, President, Columbine Capital Services, Inc. and Anthony E. Spane, Chief Investment Officers, Spare, Tengler, Kaplan & Bischel, Inc. distributed a paper entitled Dividend Yield and Efficient Frontiers". They jointly presented the results of their study, which focused on the classification of stocks on the basis of dividend yield and change in dividend yield. The expectation was that a dividend yield change may be a more useful signal of corporate management's confidence in future earnings growth and stability than either the dividend yield itself or the dividend level change. The expectation seemed better justified for large than for small capitalization stocks.

The data base included 1,500 stocks divided into the 500 largest, the 500 smallest, and the 500 intermediate. Each group was divided into deciles two ways. One sort was on the dividend yield, and the other was on the dividend yield change over 48 months. Combining the two sets of deciles produced 100 cells. For each cell, the authors reported the percentage of the set of stocks represented in that cell, and the average excess returns for the stocks in that cell over 12, 24, and 36 month holding periods. In general, combinations of above average dividend yield and above average yield change showed the best results, but identifying the best cells required a good deal of judgment. For example, the first decile dividend yield, first decile yield change combination would prove to be a poor choice. Spare commented that stocks in this cell were very likely to have their dividends cut or eliminated.

The value of the screening showed up when the yield change measure was combined with the "combo model" already in use by Spare for stock selection. While returns were not generally increased, standard deviations were dramatically reduced, to produce a much superior return/risk combination.

85. THE LONG RUN PERFORMANCE OF INITIAL PUBLIC OFFERINGS (Fall, 1990)

Jay R. Ritter, Associate Professor of Finance, University of Illinois distributed a paper entitled The Long Run Performance of Initial Public Offerings. His most important conclusion could be stated as: Investors purchasing initial public offerings (IPOs) of common stocks in 1975-84 substantially underperformed the market during the three years after the offering, in spite of an average initial return from the offering price to the closing price on the first day of trading of over 14%. The research was based on a sample of 1,526 IPOs in the United States in the 1975-84 period. The criteria for those included were: (1) an offer price of $1 per share or more, (2) gross proceeds of $1 million or more, (3) an offering only of common stock, (4) reporting of the company on the CRSP daily Amex-NYSE or NASDAQ tapes within six months of the offer date, and (5) the IPO was managed by an investment banker. For each IPO, two rates of return were calculated: the initial return, for the offering date to the first closing price listed on the CRSP daily return tapes (normally a one-day period following the offering), and the return for the 36 months following the offering.

A portfolio consisting of all 1,526 IPOs did indeed have a raw return of 24% over the three years following offering, but after adjustment for any one of four benchmarks, the 36 month rate of return turned negative. In other words, the IPOs underperformed all four benchmarks. The benchmarks used were: (1) the CRSP value-weighted NASDAQ index, (2) the CRSP value-weighted Amex-NYSE market index, (3) listed firms matched by industry and size, and (4) an index of the smallest size decile of the New York Stock Exchange.

Ritter continued his talk with a discussion of a number of arrays of the IPO outcomes, offering insights into sources of the relatively poor performance. The three year holding period return, following the initial return, ranged from essentially -100% to +3,964%. There were a few spectacular successes, although overall the group performance was disappointing. The smaller offers tended to have the highest average initial (one day) returns, but the worst after-market performance. On the whole, the initial returns were satisfactory. Those who bought as part of the IPO and sold shortly afterward tended to do.
quite well. The tendency for IPOs with high initial returns to show the worst after market performance is mildly supportive of the overreaction hypothesis. The offering price set by investment bankers was apparently a superior forecast of future market prices than the market price shortly after trading commenced.

Segmentation of the IPOs by industry classification revealed some interesting patterns, although the long-run underperformance was present in all but financial institutions, drugs, and airlines. The financial institutions group was largely made up of offerings by mutual savings institutions turning into stockholder owned institutions.

Performance categorized by year of issuance was particularly interesting, since the underperformance was characteristic of the IPOs in only five of the ten sample years. IPOs in 1975, 1977, 1978, 1979, and 1984 all ended up outperforming the market, at least slightly, over the three years after issuance. The corollary of this observation was that the high IPO volume years led to poor results. It is perhaps not surprising that when the market was "hot" and there were many IPOs, investors were ultimately disappointed. The best results were gained by buying IPOs when they were less popular. Ritter closed with the comment that probably the most important factor in predicting the ultimate performance of an IPO is the volume of IPOs at the time of issue.

86. THE EFFECTS OF MARKETABILITY ON EQUITY VALUE (Spring, 1990)

William L. Fouse, Chairman, and Thomas Loeb, President, Mellon Capital Management, distributed a paper entitled *The 'Small Stocks Hoax'*. Fouse described their work as an examination of the widely propagated belief that small capitalization stocks offer investors higher returns than large capitalization stocks. He said there are three ways in which investors can win with small stocks. One comes about through favorable earnings surprise. Or investors in small stocks may benefit from a collapse in risk premiums or market liquidity premiums for small stocks. Finally, it may be possible to trade in the small stocks at costs that are low enough such that the investor does not have to pay a premium for illiquidity.

The benefits of earnings surprise are earned over intermediate time periods. Benefits from changes in risk or liquidity premiums are likely to be short term. But harvesting illiquidity premiums is likely to require the long term. And all three of these benefits can turn into disadvantages of small stocks.

Using rates of return for two universes of small stocks -- the Ibbotson Associates Small Stock Series and the Russell Two Thousand, Fouse compared rates of return for small stocks with returns for the S&P 500 over periods ending 12/31/88. The advantages or disadvantages of small stocks compared to the S&P 500 proved to be very time dependent. So Fouse raised the question why investors arrived at high expectations for small stocks. His answer was the publication of a number of academic studies "proving" that there are returns to small size. The data, and the analysis in these studies reflected a number of questionable assumptions. Inadequate allowance for the cost of transactions, and the "not been traded" effect were identified by Fouse as the source of substantial bias. The not been traded effect comes about because much of the testing that purported to prove the advantages of small cap stocks required frequent rebalancing of portfolios. Rebalancing simulations require specification of stock prices, and assumed prices may be somewhat different from the prices that would have been paid if the rebalancing transactions had actually taken place. Fouse demonstrated the sorts of biases that are introduced by the assumptions.

He went on to criticize research that has been based upon the Ibbotson Associates statistics for small cap stocks. The Ibbotson data reflect, before 1981, portfolios rebalanced only every five years. Fouse demonstrated that over five year periods there is substantial migration of stocks from an initially defined small stock portfolio.

Loeb continued the presentation with a discussion of transaction costs and their effects on return comparisons. Transaction costs relate to turnover rates, and most of the studies showing extra returns to smallness over market returns do not discuss turnover rates. Using conservative assumptions with respect to turnover, and allowing for transaction costs, Loeb had tracked individual decile returns as well as risk adjusted returns for the 20-year period 1970 through 1989, for each of 10 size deciles of small stocks. Rebalancing was performed first every 5 years, then annually, and then at 6-month intervals. Even on a risk adjusted basis, the small stock deciles did show some annual
return premium above the S&P 500. But the premiums were much lower than have been claimed in the literature. His conclusion was that small cap stocks are useful in achieving diversification but are priced no differently from large cap stocks using economic criteria.

87. MODELING THE RISK OF SMALL CAP STOCKS (Spring, 1990)

Richard Grinold, Director of Research at BARRA, distributed a packet of graphs and tables reflecting research carried out at BARRA. He described small cap stocks as a valuable asset class, one that is substantial enough in size to be useful, with a strong historical performance, that can be a valuable source of diversification. He offered some different definitions of the small cap universe, including a universe constructed by BARRA. The good news about the small cap universe is that it is neglected and therefore perhaps less efficient. The bad news is that with lower efficiency goes a serious information gap; transactions costs are high and indexation and benchmarking are difficult. An especially difficult problem in assembling a representative index for small cap stocks is that a rather large number of stocks is necessary to capture a significant portion of the universe. Whereas one may substantially represent the S&P 500 with fewer than 100 stocks, equivalent representation of the small cap universe may require several hundred stocks. An additional problem found with the Frank Russell 2000 Index is the tendency of the largest of the small cap stocks to move out of the 2000 and for stocks previously just too large to be included in the 2000 to move back into it. At the boundary between the largest of the 2000 stocks and still larger stocks not included in the 2000, there is enough movement back and forth to make it difficult to construct an index fund that will mimic the 2000. Grinold offered a modification of the 2000 index that could lower turnover and transaction costs, with some tracking error.

Lack of liquidity is a disadvantage of small cap portfolios, and active management is best based upon "slow ideas" that take time to mature and do not call for high turnover.

Grinold went on to describe the BARRA SMALL CAP model, which makes use of eleven risk indices and demonstrates a rather different industry mix from the mix of the S&P 500.

In conclusion, he observed that the small cap class is clearly different from the class of large cap stocks. A passive investment strategy is difficult to achieve, suggesting that active management is more likely to be appropriate. Strategies that mature slowly will be best, because of the liquidity problems. Finally, the necessary management tools are available.

88. STOCK MARKET COMPLEXITY AND INVESTMENT OPPORTUNITY (Spring, 1990)


Bruce Jacobs began the presentation by referring to the rapid evolution and replacement of investment theories in recent years. He said the Efficient Market Hypothesis and the Capital Asset Pricing Model became popular in the 1970s only to lose their popularity in the 1980s. He referred to the classification of systems into three types: ordered, complex, and random. The efficient market hypothesis was based on the supposition that the stock market is a random system, while a number of valuation methodologies assume that it is an ordered system. In fact, he said, it is a complex system in which there is a web of interrelated effects on stock returns. So an optimal strategy cannot be as simple as, for example, buying low P/E stocks or buying small capitalization stocks in January. He took the example of the apparent attractiveness of low P/E stocks to demonstrate that naive measurements of the results of buying such stocks will lead to unintentional biases towards low P/E industries (utilities) and related attributes (for example, high yield). The methodology proposed by Jacobs and Levy, on the other hand, is designed to deal with complex systems and disentangles real effects from near proxies. They refer to their method as the "pure returns method".

Making use of tables and figures from a May-June 1988 *Financial Analysts Journal* article entitled "Disentangling Equity Return Regularities: New Insights and Investment Opportunities", Jacobs compared the measured monthly average returns to anomalies, using the naive approach and using the pure returns approach. While for some anomalies the two
approaches gave very similar results, for some they gave quite different results. For example, return reversal, which is the tendency for sharp price increases to be followed by relative price retreats, shows up much more strongly using the pure returns methodology. Graphs of cumulative returns to anomalies demonstrated that while some appeared to add value consistently over long periods of time, others gave positive returns at times and negative returns at other times. The pure returns methodology could be useful in separating the two types. Comparing the naive and pure returns testing of various anomalies also shed some light on which anomalies were serving as proxies for which other anomalies.

Ken Levy continued the presentation with a discussion of cumulative returns due to selected anomalies, including revisions of earnings forecasts by securities analysts, and return reversals. He commented that the cumulative return record provided independent evidence of the fallacy of both the weak and semi-strong forms of the Efficient Markets Hypothesis. He went on to question the usefulness of value models that are based on the proposition that prices will return to true value. And referred to the Jacobs and Levy article "On the Value of Value", in the July-August 1986 Financial Analysts Journal. He then contrasted value modeling with risk modeling. Risk models are designed for risk control and work quite well because definitions of risk seem fairly stable, and the models can be used with publicly available data. Return models, on the other hand, require disaggregation so that individual effects, like return reversal for example, have to be modeled separately. The data needed are not all publicly available and the methodologies that are appropriate are generally proprietary.

Levy described the pure return effects as falling into two categories. First are the "anomalous pockets of inefficiency". They represent anomalies to the efficient market hypothesis and he described them as pockets of opportunity. They seem to be psychologically motivated. The second kind of pure return effects are "empirical return regularities". The payoffs to these effects, unlike the payoffs to APIs, can be unstable over time. They are nevertheless regular and predictable in a broader empirical framework, with the use of macroeconomic information. The small size effect would be an example of an empirical return regularity, while return reversal would be an example of an API.

Levy discussed modeling the size effect, referring to the article of that title in the May-June 1989 Financial Analysts Journal. The trick was disentangling the pure returns to size from related factors such as firm neglect, low P/E and calendar effects, such as tax-loss selling. The most successful methodology made use of a Bayesian vector time-series. The model starts with a random-walk prior and makes use of six macroeconomic variables: corporate bond rates, treasury bond rates, T-bill rates, S&P 500 returns, the consumer price index, and industrial production.

89. NEGOTIATED LARGE BLOCK TRADES (Spring, 1989)

Michael J. Barclay and Clifford G. Holderness, Professors at the William E. Simon Graduate School of Business Administration, University of Rochester, distributed a paper entitled Private Benefits From Control of Public Corporations. Barclay made the presentation, and it began by describing the purpose of the research. Two traditional assumptions in modern finance are that the ownership of public corporations is diffused across many shareholders, and shareholders receive benefits from the corporation in proportion to their fractional ownership. But some recent evidence casts doubt on these two assumptions. First, ownership of public corporations is fairly concentrated, as some Securities and Exchange Commission statistics indicate. And second, the fact that substantial blocks of stock in public corporations can command substantial premiums over quoted market prices suggests that there are benefits that go with large blocks of stock that are not available to other shareholders. Barclay referred to "block premiums" as evidence of "private benefits". The research had examined 63 block trades, taking place in private transactions off the Exchange over the years 1978 through 1982. These were essentially all the reported trades involving blocks amounting to 5% or more of the outstanding stock of a corporation, but excluded trades that were related to tender offers. The blocks ranged from 6% to 60% of outstanding stock, and averaged 20.7%.

What was of interest about these block trades was that the prices showed an average premium of 20.4%. This premium represented the difference between the price paid for the
block of shares and the post-announcement Exchange price. One might expect that this latter price reflected news of the block transaction and therefore impounded any expectations that might flow from that transaction. For example, if investors expected the transfer of the block to result in better management and improved performance, then the post-announcement price would have moved up from the pre-announcement price, to reflect these improved expectations. And that increase in price might be described as representing "shared benefits" - that is, benefits shared by all stockholders and not restricted to the purchaser of the block. But to the extent that the price paid for the block exceeded even the post-announcement exchange price, one might infer that the purchaser of the block expected to obtain benefits that would not be available to the other shareholders.

Having established the extent of the private benefits, in terms of the premium paid for blocks of stock, the authors of the study had performed cross-sectional regressions in an attempt to explain the premiums. The larger the per cent of the total equity of the company represented by the block, the larger the premium. The larger the firm size, the larger the premium but the premium increases at a decreasing rate with firm size. Where the purchaser of the block is an individual, the greater the leverage of the firm, the higher the premium. But where the purchaser is a corporation, the degree of leverage does not appear to affect the size of the premium. Barclay explained these results in terms of the relative ability of individuals and corporations to finance the acquisition of a block of stock. Where the buyer was an individual, the greater the volatility of stock returns the lower the premium, while if the buyer is a corporation the volatility appears not to affect the premium. Again, Barclay's explanation had to do with the probably smaller financial resources of the individual buyer.

He turned next to the question of why some blocks are priced at discounts. Twenty percent of the block trades studied took place at discounts. One possibility is that the purchaser of the block was making commitments to the company in return for a discounted share price, and Barclay produced one likely example of this. Substantial discounts seemed to be associated with firms in severe financial distress at the time of the block trade. And it may have been that the seller of the block believed it was preferable to take a discount on the sale than to break the block up into small components and in the process perhaps drive the stock price down even further.

Barclay went on to discuss the motivation for the acquisition of a large block at a premium. There may be an anticipation of both shared benefits and private benefits. The private benefits are not extraordinarily large. While in this study they represented 13% of the average block purchase price, they represented only 4% of the average value of the firm's equity.

Barclay concluded with some comments on the implications of the study for the Q Group audience. It is not likely that institutional investors - pension plans for example - can derive private benefits from the acquisition of blocks of stock. But institutional investors do accumulate from time to time substantial blocks, and in selling those blocks they should be aware of the possibility of extracting a premium from buyers who do see the potential for private benefits.

90. NOISE TRADERS IN FINANCIAL MARKETS (Spring, 1988)

Lawrence Summers, Nathaniel Ropes Professor of Political Economy at Harvard University, distributed two papers. The first was by himself and James M. Poterba, of the Massachusetts Institute of Technology entitled, Mean Reversion in Stock Prices: Evidence and Implications. The second was by Summers, J. Bradford De Long, Andrei Shleifer, and Robert J. Waldmann, of Boston University, the University of Chicago, and Harvard University, respectively, entitled, The Economic Consequences of Noise Traders.

Summers began with a brief discussion of the efficient market hypothesis. He described it as a powerful theory that has affected a substantial amount of research and investment practice. Further, the hypothesis is said to be the most thoroughly tested of all hypotheses used in the social sciences. Yet the tests have never been very conclusive. He proposed tests to distinguish between the hypothesis and plausible and interesting alternatives. He proposed that stock prices in the market instead of reflecting purely fundamental value might represent fundamental value plus some noise which he characterized as the "fad" influencing a number of investors. The efficient market hypothesis would say that the noise contribution is zero; his hypothesis was that the noise
component may be quite important. He constructed a simulated series of stock prices based upon a fad element with a standard deviation of 30% and a half life of three years (so that the value of the fad element would be expected to decay by 2% per month). This hypothesis would imply that 75% of the variance in monthly returns is due to the "fad" element. He then presented the results of applying the standard efficient market hypothesis tests to his simulated series of returns. A first-order autocorrelation test would lead to over a 90% chance that his price series would be interpreted as consistent with the efficient market hypothesis. Further standard tests would not prove much more successful. In other words, a plausible hypothesis of stock prices, clearly inconsistent with the efficient market hypothesis, would not be distinguished from that hypothesis by a number of the commonly used tests.

Although one cannot expect to be able to capture all of the information that the efficient market hypothesis would argue should affect stock prices, and therefore to test the theory completely, Summers presented a number of analyses relating substantial changes in the market to whatever news appeared to accompany those changes, and relating significant news items to the changes that actually took place in the markets. His conclusion was that one simply cannot argue that the market changes were caused by news, that is, by new information reaching investors.

There is good evidence that trading itself generates volatility. Summers described the work of French and Roll comparing volatility during the period when the New York Stock Exchange was closed on Wednesdays to volatility when Wednesday was a trading day, to demonstrate that volatility can result from the fact that trading is taking place, rather than from the receipt of news by investors. The discounts on shares of closed end stock funds offer further evidence that trading itself introduces volatility that is priced out in the market. As further evidence that stock price changes cannot be simply the result of news, Summers offered a chart of the combined value of the equity in Texaco and Pennzoil, through the period of the 1986 litigation up to 1988. Although the litigation concerned no more than transfers of value between the two companies, their combined equity value declined by something like $2 billion as Pennzoil won its case against Texaco in 1986.

In conclusion then, there is ample evidence that stock prices respond to more than news. Summers next suggested that economic theory suggests the importance of noise in the stock market. He introduced the idea of the "noise trader". In one of the papers that were distributed noise traders are defined as those who falsely believe that they have information about the price that a risky asset will sell for in the future. While one might hope that misvaluations would be corrected through arbitrage by investors relying on fundamentals, noise prevents the identification of misvaluations. In addition, risk limits the exploitation of misvaluations. Rational investors (as opposed to noise traders) may be discouraged from acting to bring about a correction of mispricing because of the additional volatility they perceive in the market that is brought about by the noise trading. The argument has been made that noise traders are bound to lose money and will disappear from the market. Summers pointed out that on the contrary noise traders may indeed flourish. All that is necessary is that these traders be generally "bullish" but not too bullish.

A study of variance ratios indicates that mean reversion takes place at relatively long time horizons, but the opposite effect can be seen over short horizons. Investors with long time horizons will experience lower variance than one might expect if the market truly adhered to the random walk hypothesis. But variances over short time horizons will be higher.

The evidence leads to the formulation of a theory that the market is made up of two types of traders: sophisticated traders and noise traders. The sophisticated traders are in principle investors interested only in fundamentals. Yet they are aware of the presence of noise traders, and must therefore take into account the effect the noise traders will have on prices. In particular, they must take account of the increased volatility that results from the activities of noise traders. Summers demonstrated that this formulation of the trading market can lead to chaotic dynamics and to very sharp upward or downward moves in stock prices.

The most important implication of Summers' research is that risk/return relationships are very attractive for long horizon stock investors, and relatively unattractive for short term investors. Another conclusion is that frequent marking to market of stock portfolios
may be undesirable. It may be better to smooth market values to approximate fundamental values. Finally, intervention in markets by way of taxes or other regulatory devices, in order to slow sharp price movements, may be appropriate. The usual objections to this sort of interference rest on the proposition that price moves are always in accordance with fundamental developments. But Summers has argued that this is simply not the case.

91. MEAN REVERSION IN STOCK PRICES: A BEHAVIORAL INTERPRETATION (Spring, 1988)

Richard Thaler, H. J. Louis Professor of Economics, Johnson Graduate School of Management, Cornell University, distributed a reprint of an article by himself and Werner F. M. DeBondt from the Journal of Finance, entitled, Further Evidence on Investor Overreaction and Stock Market Seasonality.

Thaler began with a brief introduction to behavioral economics. Theories of behavior can generally be divided between the normative (indicating how people should behave) and the descriptive (indicating how people actually behave). In economics, particularly financial economics, we tend not to distinguish clearly between the two. The theorist presumes that agents in the economy act rationally and as though they have full information at all times. Behavioral economics tries to go beyond this rather simplistic assumption and enrich the economics model. In particular, we want to understand what the simple model has had to characterize as "anomalous" empirical phenomena.

An important concept of behavioral economics is "framing" --- the manner in which a problem is described. Under the more traditional model choices depend upon the objective features of the alternatives offered. In the enriched model choices also depend upon the manner in which the alternatives are described or framed. Thaler offered a number of examples of phrasings of questionnaires to show how responses depend not only upon the essence of the question, but how the question is expressed. And he listed a number of characteristics of ways in which people solve problems that conflict with traditional economic theory: opportunity costs are not always equated to out of pocket costs; sunk costs are not ignored; hindsight bias means that people recollect prior judgments as being more consistent with events as they actually happen.

The specific bias to be addressed by Thaler was overreaction. He proposed that people generally do not follow Bayes’ rule; they tend to overweight recent information and underweight their prior judgments. Forecasts tend to be overconfident and underestimate mean reversion.

The traditional economic model applied to the financial markets tells us that price movements are unpredictable and that they depend only on rational factors. Either all of the participants are rational, or the market is at least dominated by the rational players. The behavioral model tells us that price movements are somewhat predictable; that traders react to each other as well as to economic news; and traders are influenced by fashion and fads. Essentially, the proposition is that at least some investors are human.

Referring to the research published by himself and DeBondt, Thaler described research based upon stock price data from the CRSP monthly return tapes for 1926-1985. Working with rolling ten-year periods, the researchers used the first five years to identify the 35 best performing stocks -- the "winners" and the 35 worst performing stocks -- the "losers". The performances of the winners and losers were then tracked over the second five years. During the second five years, the losers consistently outperformed the winners. The losers in fact did considerably better than the average for all stocks, while the winners did somewhat worse. The reasons for the asymmetry were not entirely clear:

Thaler referred to other research that has reached much the same conclusion, that the market overreacts, losers are bid down too far and produce excess returns, while winners are bid up too far and produce poor returns. There is evidence that the larger and the faster the first price move takes place, the larger will be the reaction.

To ensure that the results he had found were not simply caused by identification of high and low risk stocks, Thaler had performed a careful analysis using beta coefficients. It turned out that adjusting for beta coefficients made the results even stronger. The winners proved to have low betas in up markets and high betas in down markets, while the losers were just the
opposite. Thaler next reported an investigation of the question whether the losing firm effect that he had discovered was the same as the small firm effect. His conclusion was that the small firm effect was not the source of the losing firm effect. There appear to be two different but related phenomena here.

Finally, Thaler discussed what had happened to earnings for his winners and losers. During the formation period, that is the five year period during which the losing stocks were falling in price, earnings were also falling dramatically. In the subsequent five year period the earnings for these stocks recovered substantially but not entirely. For the winners, in the formation period earnings rose sharply and in the subsequent five years they were almost flat. The fact that the earnings for the winners did not decline in the subsequent period may help to explain the asymmetry in the performance during this five year period of the winners and losers.

A question posed to the speaker suggested that the event that was the cause of overreaction in this study was a price change and that conceivably the overreaction could be to noise rather than to any real economic event. The suggestion was that one might use a news event rather than a price move as the starting point and then look for overreaction.

92. EARNINGS YIELDS, MARKET VALUES AND STOCK RETURNS (Fall, 1987)

Donald B. Keim, Assistant Professor of Finance at the Wharton School, University of Pennsylvania, distributed a paper by himself and Jeffrey Jaffe, and Randolph Westerfield entitled Earnings Yields, Market Values and Stock Returns. In discussing the reasons for this new piece of research, he referred to prior research on the superior performance of small capitalization and low earnings/price ratio stocks, a series of research papers that had ended in disagreement.

More specifically, Reinganum had worked with data for 1963 to 1977 and had concluded that there was a size effect but not an earnings/price effect. Basu, working with data for 1964 through 1979 had reached the opposite conclusion. Cooke and Rozell, working with data for 1964 through 1981 had concluded that there was both a size effect and an earnings/price ratio effect and that the two could not be distinguished. Finally, Bohn and Breen, working with data for 1974 through 1983 had concluded that there was a size effect but not an earnings/price ratio effect. Keim saw four reasons why these earlier studies had failed to agree. First, each had made use of a relatively short time period largely because data were unavailable for longer periods, so that their results are likely to be specific to the time periods studied. Second, all but the Cooke and Rozell studies had failed to account for significant differences in returns between January and other months. Third, there were differences in methodology, and fourth, there was potential bias from the manner in which data were selected and the manner in which portfolios were put together.

The study reported by Keim made use of a much longer period than had been used in the previous studies, one extending from 1951 through 1986. Biases were carefully controlled; the work made use of both an analysis of portfolio returns and regression analysis; and a careful distinction was drawn between results for January and results for other months.

Stock return and price data were drawn from the CRSP monthly data from 1951 through 1962 and from the daily data from 1963 through 1986. Earnings data came from Compustat files for 1950 through 1986. Only companies with fiscal years ending on December 31 were included, and portfolios of stocks were updated annually on March 31, when the earnings results for the preceding year should have been known. The number of stocks included each year averaged about a thousand, ranging from a low of 352 in 1950 to a high of 1309 in 1974.

For comparison purposes, portfolios were formed in 2 ways. One way was to rank all of the stocks by earnings/price ratio, divide them into 5 quintiles, then rank each quintile by capitalization size and divide it into 5 more quintiles. This led to 25 portfolios. In addition, the stocks with negative earnings/price ratios formed another group which was in turn divided into 5 quintiles by size. In all then there were 30 portfolios. The second approach began with size ranking and quintiles arrayed by size, with each of these further divided into quintiles by earnings/price ratio.

For the full time period 1951 through 1986 returns were negatively related to market value and positively related to the earnings/price ratio. But market values themselves were correlated with the earnings/price ratio. So the
research proceeded to make use of a regression model to simultaneously test for significance of the size and earnings/price ratio effects. For the overall 1951 through 1986 period, there was a significant earnings/price ratio effect but no independent size effect. Further, both the earnings/price ratio and the market value effects were significant in January, while for other months of the year the earnings/price effect was modest and there was no size effect.

When the methodology was applied to subperiods corresponding to the periods studied in earlier papers, it was found that the results of those earlier papers were generally confirmed.

The research was extended to add stock price itself to the regression. The conclusion reached was that it is difficult to disentangle a price effect from a size effect. There is a negative relation between returns and size and/or price primarily concentrated in January, while there is an earnings/price ratio effect throughout the remainder of the year.

93. MARKET EFFICIENCY/INEFFICIENCY -- THE ACADEMIC VIEW (Fall, 1986)

Robert C. Merton, Professor, Massachusetts Institute of Technology, distributed a paper entitled On the Current State of the Stock Market Rationality Hypothesis.

Merton's presentation dealt with the issue of stock market rationality, and focused on the central economic question: do real-world capital markets and financial intermediaries, as a practical matter, provide a good approximation to those ideal-world counterparts that are necessary for efficient investor risk bearing and efficient allocation of physical investment? He expressed the concept of market rationality as essentially the proposition that security prices are based on fundamentals. The price of an asset can therefore be represented as the present value of a series of cash flows. If we add to the concept of market rationality the proposition that the market is informationally efficient, then we are proposing that the information upon which prices are based is of generally high quality and that it is difficult for any individual participant in the market to improve on the market's valuation of an asset. This is not to say that it is impossible to achieve excess profits through better information or improved processing of information, but it does exclude the possibility that these excess profits can be large compared with the total market.

From the point of view of an economist, the efficiency that is most important is allocational efficiency. The relevant question is whether market prices allocate investment dollars efficiently. One could have informational efficiency and not allocational efficiency but we cannot have allocational efficiency without informational efficiency. So the question of informational efficiency is important but not conclusive with respect to the more important issue of allocational efficiency.

Merton traced the history of market theories and in particular theories of market efficiency. In the 1960s we saw William Sharpe's Capital Asset Pricing Model, an equilibrium model of capital markets. At the same time the University of Chicago introduced its data base that has been used for so much empirical testing, and at about the same time Paul Samuelson put forward his important proposition with respect to the martingale property of properly anticipated price changes.

Work on the efficient market hypothesis really began once the University of Chicago data base was in place, and was conducted largely by Eugene Fama and others at that University. Exhaustive exploration of serial correlations, filtering techniques, and technical rules for predicting excess returns, produced negative results, confirming the hypothesis. At the same time, tests of money manager performances tended to refute the proposition that secret trading rules might be profitable even if publicly known rules were not.

While the early empirical testing almost all supported the proposition of market efficiency, in the late 1960s and 1970s evidence began to accumulate on the existence of anomalies, whether or not these might be considered flat challenges to efficiency. Researchers discovered a price/earnings effect, a small firm effect, a January effect, a market overreaction effect, and, in the case of the Modigliani and Cohen article, evidence that the market was not correctly anticipating the effects of inflation. While this evidence was accumulating, practitioners were accepting enough of the efficiency hypothesis to agree that the objective of active management is to add a marginal return above the market return, and that the results of active management should be
judged on the basis of whether or not it achieved this marginal return.

Merton turned now to two important aspects of the efficient market hypothesis. The hypothesis would say that one cannot improve on the market forecast of security price changes by forecasting economic events. The stock price changes are themselves predictors of the economic events. But one should be able to discover as time goes on the future economic events that inspired the stock price movements. Empirical research on the first proposition, the inability to improve on the forecasts of the market itself, generally supported the proposition. But empirical research on the second proposition, that one could identify economic events following price changes, has not been as successful.

Another set of empirical tests has concerned not price levels as such but the volatility of prices. If security prices are rational predictors of cash flows, and if we can assume a constant discount rate, then one would expect prices would be about as volatile as the cash flows themselves. Research by Robert J. Shiller, which was presented to the Spring 1981 Q Group Seminar, indicated that prices are far more volatile than dividends, and therefore posed a real challenge to the efficient market hypothesis. Marsh and Merton, however, in a paper that was also presented to the Q Group at the Spring 1985 Seminar, offered conclusions that conflicted with those of Shiller.

Other tests of volatility have supported the proposition that trading in the marketplace may by itself contribute to price volatility. Merton's conclusion was that we are left with some evidence challenging the efficient market hypothesis and that the testing that has been undertaken has suffered both from deficiencies in reported statistical significance and in the fact that many tests were tests of a joint hypothesis of market efficiency and a particular market model.

Turning to the future, he referred to two lines of inquiry into the possibility of nonrationality and systematic investor errors. One concerns speculative rational bubbles, which one might describe as deviations from rationality that simply do not disappear and therefore provide no basis for speculative profits. The other line of inquiry pursues the possibility of cognitive misperceptions. The likelihood of constant market overreaction or underreaction is an example. Merton expressed some skepticism about the likelihood that cognitive misperceptions could contribute to inefficient market pricing. Cognitive misperceptions appear to pertain to individual rather than group behavior, and are therefore not likely to affect institutional investment decisions.

As we go forward with testing, we need to be better able to distinguish a test of a market model from a test of market efficiency. And we should not be misled by applying new models to old markets and drawing conclusions of inefficiency. One should not expect the markets of many years ago, when investors were dealing with an older technology, to appear efficient in the light of new technology. He suggested it would be worth looking at models of diffusion of ideas. How long does it take for a new technology to become part of the market evaluation process? Whether or not market rationality is sustained in future testing, the testing cannot help but lead to better understanding. Rejection of market rationality would mean the advent of a whole new theory. Confirmation of the rationality hypothesis should lead us to a set of new questions having to do with information transfer, the influence of institutional and regulatory restrictions, and theories of consumer behavior.

94. MARKET EFFICIENCY/INEFFICIENCY -- THE PRACTITIONER'S VIEW (Fall, 1986)

William L. Fouse, Chairman, Mellon Capital Management Company, distributed a set of tables and graphs around which he had organized his presentation. He began with evidence supporting a skeptical view of the ability of professional managers in general to improve on the performance of the market. First, he presented evidence that the reported results for professionally managed portfolios may contain an upward bias. Next, he estimated that the amount by which the median manager performance fell below that of the market corresponded very closely to the probable transaction cost incurred by that manager.

Some historical statistics on turnover for managed equity portfolios from 1961 through 1985, suggested that the careful monitoring of performance that began in the early 1960s, and the consequent contest among managers, pushed turnover up substantially over the twenty-five year period. Transaction costs
therefore have become a more substantial drag on the performance of professional managers.

Fouse next referred to some correlation studies indicating a lack of consistent superiority among professional managers. That is, rankings of managers by performance over one period of time proved almost useless for predicting the ranking over a subsequent time period.

Fouse had conducted in 1970, while he was at the Mellon Bank, a test of market efficiency. He calculated earnings growth rates necessary to explain existing stock prices, and then compared these growth rates to forecasts made by Wall Street analysts. The two series correlated very closely, (the R squared was 0.90) suggesting that market prices impounded the forecasts of analysts at what were at that time considered to be the leading investment firms. A repetition of this exercise, using forecasts of analysts at the Mellon Bank, produced much the same result.

Fouse next turned to the proposition that excess returns can be achieved by investing in small capitalization stocks. First, it appeared that the excess returns could be explained to some extent on the grounds of reduced liquidity in small cap stocks. And second, the higher transaction costs incurred in small cap stock investing (using cost estimates developed by Thomas F. Loeb and reported at a Q Group Seminar in the Fall of 1982) explained most of the rest of the apparent excess return. Referring to the Wells Fargo "yield tilt" strategy recommended for tax exempt investors, Fouse commented that both beta and yield appear to have been systematically priced. The new tax legislation might be expected to eliminate yield as a source of extra return, and indeed Fouse's report was that the price of yield is now close to zero.

In closing, Fouse offered four recommendations:

1. Always suspect methodological errors by empiricists.

2. Always seek an economic explanation/valuation support for what you do.

3. Don't overlook implementation costs.

4. Never underestimate the collective intelligence and abilities of your adversaries in the zero sum game.
STOCK VALUATION - METHODOLOGY AND PRINCIPLES

95. COMBINING JUDGMENTAL INPUTS IN EQUITY INVESTING
(Spring, 1990)

Daniel Rie, Senior Vice President of Colonial Equity Management Inc. described his presentation as a progress report on work he and Paul Samuelson have undertaken. They have developed a simulation model as part of an effort to improve the way in which managers' judgments are combined to assemble portfolios.

The process sought after must meet a number of criteria. First, as markets change the process must adapt. Second, those who participate in the process must see themselves involved and must be able to see the results of their individual participation. Third, the process must lead to portfolios whose characteristics achieve specific client goals. And fourth, it must be possible to sell both the process and its results to clients.

Colonial manages mostly load mutual funds. One consequence is that there are relatively few interactions with the ultimate clients -- the mutual fund shareholders -- or even with the brokers who sold the fund shares. This leads to fewer constraints on the manager than may be the case in an institutional management business. For one thing, it may be easier to experiment.

At Colonial, portfolio managers are perceived as generally doing a good job, but their abilities are not uniform. Some work had been done on the quality of information going into the portfolio selection process and the reliability of results. Rie and Samuelson decided to take a quantitative approach to modeling a combination of predictions. The process of combining predictions had to cope with varying levels of skill on the part of those making the predictions, and a high degree of uncertainty in those predictions. Both firms and managers would be simulated together in a multi-factor model. For the firms in about 30 industries, data on factors are combined with manager estimates of factor exposures, industry exposures, residual standard deviations, and additional attributes of the firms.

Correlations of managers' forecasts with true rates of return, and with each other's forecasts, provided some insight into the relative value of each managers' forecasts as well as the extent to which managers reached their results independently.

Rie and Samuelson tested a number of ways of combining forecasts. For the decision on each stock, one might simply pick the forecasts of the apparently best manager. Or one might average the forecasts of the managers. Or one might construct a weighted average, based upon the apparent skill of the managers. Or one might weight the average on the basis of consistency or reliability. Rie presented the results of seven different methods of combining managers' forecasts.

It was difficult to say exactly which method had worked most successfully. The object was to combine the different skills of the managers, the different reliability of managers' forecasts, and whatever independence existed among managers' forecasts to make the best possible use of their collective skills. Rie had concluded that there was no neat analytical way to determine the best methodology. But attempts at optimization did seem to produce better results than simply averaging forecasts across the managers.

Rie commented that even if the modeling does not lead to improved rates of return from the managers' forecasts, it does lead to a better understanding of risk and opportunities for increasing the overall risk level of portfolios, in the expectation that this will lead to increased returns.

96. NEW ECONOMIC COMPONENTS OF VALUATION (Spring, 1990)

Roger F. Murray, S. Sloan Colit Professor Emeritus of Banking and Finance, Columbia Business School, distributed a paper entitled New Economic Components of Valuation. He began by establishing four microeconomic factors that will define stock values: the growth rate of economic activity, the rate of both expected and unexpected inflation, the level and term structure of interest rates, and risk premiums. To forecast stock values we must forecast these variables. To accept the present levels of these variables as representative of the future is not very helpful. Nor is reliance on historic behavior of the variables. Yet we need some sort of benchmark against which to measure the state of the variables and stock prices at any point in time.
Murray drew a distinction between attempts to predict prices of stocks and attempts to determine intrinsic value. Following the second approach, he presented a brief analysis of an intrinsic value determination for the S&P 400 industrials, and a comparison with the current level of that index suggesting that it may be significantly above intrinsic value. His example made use of the familiar equation

\[ V = \frac{D}{K - g} \]

where \( V \) is the intrinsic value, \( D \) is the dividend, \( K \) is the required return and \( g \) is the growth rate. He was careful to develop \( g \) as the projection of a trend line, concluding that recent earnings growth is not sustainable. And he developed \( K \) by adding a risk premium to the AAA bond yield. He went on to show the adjustments in assumptions that would be necessary to bring intrinsic value up to current market prices.

Murray went on to discuss leverage, and possibilities for enhancing stock values through financial leverage. He argued that a certain amount of debt in the capital structure does indeed reduce cost of capital to an industrial corporation and will enhance the value of the corporation's stock. But as leverage increases, the risk premium increases, the cost of capital increases, and the result will be a negative impact on the stock value. He considered the argument that there are gains to be made from taking corporations private, and expressed skepticism that a loss of marketability and liquidity in a corporation's shares can lead to increased value.

Finally, he turned to what he saw as the opening of the U.S. economy. Until the last five years or so as a practical matter United States capital markets were influenced largely by domestic developments. Now we find powerful foreign forces at work. Turning to the intrinsic value model, Murray discussed the impact on the expected growth rate \( g \) and the discount rate \( K \) of this opening of the U.S. capital markets. He concluded that stable economic growth without material inflation will be more difficult to attain, and that risk premiums are likely to rise leading to higher discount rates. And in the opening of the U.S. capital markets he found even more reason for less reliance on history in assessing the value of corporate equities.

Finally, he found the case for much greater international diversification of equity portfolios very compelling.

97. HOW A MODERN DAY CIO LOOKS AT THE INVESTMENT PROCESS (Spring, 1990)

Martin Leibowitz, Managing Director of Salomon Brothers Inc., introduced the topic and the panel. He said that although recent years have seen substantial growth in the development and application of quantitative techniques in investments, we still see active managers building stock portfolios in very traditional ways. So he had found it appropriate to ask some chief investment officers with a vision that goes far beyond the quantitative, to describe how quantitative analysis has affected their businesses.

John W. English, Vice President of the Ford Foundation, spoke first. He described some of the history of pension fund management in the AT&T system, beginning with concentration of all pension funds with Bankers Trust, then their movement out to the 23 telephone companies, Western Electric, and Bell Labs, and thence largely to local banks. In 1970, after disappointing results at the banks, the funds were moved on to a variety of professional managers. In 1972 modern portfolio theory and computers arrived at AT&T, and led to the development of internal index funds. In 1975, new vehicles for investment were found, and in 1978 derivative securities were used as well. Then in 1980 there was a reversal of the decentralization, when it was found that over 100 professional investment managers generally produced a performance inferior to that of the stock market. So the funds were all brought back home to AT&T for management. Then in 1982 the AT&T divestiture led to a redistribution of all of those funds out to the new regional companies.

English followed his 30-year backward look by a 30-year forward look. He predicted that at the end of another 30 years the normal workplace for those engaged in investment management will have shifted out of the cities and indeed many will be working from their own homes. Further, they will very likely be carrying a trading room on their wrists, through audio and visual communication.

Leon G. Cooperman, Chairman and CEO of Goldman Sachs Asset Management,
discussed the impact of new quantitative techniques on his operation. He observed first that a lot of new terminology has been introduced into the business but for the most part stock selection has not changed a great deal. Modern portfolio theory is useful in controlling portfolio risk, but he feels that an obsession with beta and statistically determined residual risk may lead strict followers of MPT to miss some very important effects.

An emphasis on efficiency in markets has placed a challenge before active management and put considerable pressure on practitioners of active management. He believes that the indexing that has been encouraged by MPT has created difficulties in the marketplace. Indexing to the S&P 500 may be restricting the flow of capital to small- and medium-sized companies. Indexing also discourages research, and the efficiency of the markets depends upon research.

While MPT does permit a better understanding of portfolio risk, it does not generally lead to improved rates of return. For this, old-fashioned security analysis is still the best methodology.

He believes that active managers add value in three ways: through risk analysis that leads to aggressive and defensive positions; through asset allocation which leads to improved performance as stocks, bonds (both above and below investment grade) offer attractive opportunities; and through individual security selection.

John H. Hobbs, President, Jennison Associates, described himself as an old-style CEO who nevertheless became one of the early BARRA clients in the 1970s.

Modern portfolio theory suggests that markets are generally efficient, something Hobbs has never believed. He agrees that most managers cannot beat the performance of the marketplace, but has trouble accepting the proposition that volatility is the most appropriate measure of risk. The people at Jennison have learned that volatility is at least one useful measure.

Hobbs believes that MPT has shifted a substantial amount of money to indexing strategies. Although this probably leads to some loss of clientele for firms like Jennison, Hobbs has no objection. He believes that indexing is probably quite appropriate for some funds of some clients. Quantitative management techniques have become popular and while Jennison does not engage in this kind of management, he has no argument with it as another way to manage money.

MPT has not led to any change in the philosophy or the investment process at Jennison. But Jennison has benefited through improved communication with clients. MPT has helped clients to understand what an investment manager can do for that client. Use of the BARRA measurements has helped Jennison to identify and communicate to clients and to consultants important characteristics of Jennison management.

Hobbs expressed concern about the extent to which historic data bases are being employed in quantitative applications, and the reliance on mean variance portfolio optimization. He does not like what he sees to be overreliance on a single methodology for forming portfolios and a trust in historic data that may prove poor predictors of the future.

98. EQUITY MANAGEMENT: WILL THE FUTURE RESEMBLE THE PAST? (Spring, 1990)

Jack Treynor, of Treynor Capital Management, Inc., introduced the panel. Robert A. Haugen, Professor at the University of California-Irvine, and Director of A.G. Risk Management, addressed the subject of risk management in the 1990s. He spoke of three levels of risk management. The first was achieved in the 1970s, when pension funds began to use the Markowitz model with broad equity classes. The second was reached in the 1980s when the focus shifted to sectors of the market and more recently has seemed to involve the pursuit of indexing. Haugen expressed regret that indexing appeared to have taken the place of volatility control. And he saw the roots of indexing in the capital asset pricing model with its capital market line and its focus on the market portfolio.

Turning to what he believes should be the third level of risk management, something for the 1990s, he identified three major economic threats to the pension promise. Two involve sources of funding: the consequences of prolonged economic decline and lower real investment returns. A third is related to uses of funding: unexpectedly high rates of inflation.
His answer to these three threats is to make use of dedicated stock portfolios specifically aimed at each of the threats. The risks in sources of funding call for low volatility portfolios and interest sensitive portfolios. The risk in uses calls for inflation sensitive portfolios.

Haugen devoted a portion of his presentation to the risk/return tradeoff within the equity market. He commented that the equity premium — the difference between the expected returns on bonds and equities — is too large to be easily explained. The capital asset pricing model does not provide the explanation. It appears that one does not have to make a large sacrifice in expected return in order to reduce volatility. It therefore makes more sense than one might suppose to build low volatility portfolios.

Next comes the task of identifying the targets one would like a portfolio to track. And here Haugen's point was that what we should be concerned with is tracking inflation or tracking interest rates or both, and not with tracking some stock index such as the S&P 500. So we pick our target, which could be matching inflation, we choose the beta with respect to that target, and we look for the "efficient tracking portfolio" with that beta. The efficient tracking portfolio is a portfolio on the efficient frontier where risk is measured in terms of tracking error. Haugen showed graphically the results of selecting the lowest volatility portfolio; selecting the interest sensitive portfolio (maximizing correlation with a long term bond index); and an inflation sensitive portfolio (maximizing correlation with inflation). The process of finding these portfolios requires the use of a factor model employing an appropriate factor structure with identifiable factors.

Haugen provided examples showing the industry weightings in dedicated portfolios to achieve inflation sensitivity and interest rate sensitivity. In both cases the average portfolio weightings for eleven industries differed substantially from the average weightings for the universe of stocks from which the portfolios were chosen. It turned out, for example, that the inflation sensitive portfolio was rather heavily weighted in electric, gas and sanitary services companies. Haugen's explanation was that the regulatory process provides protection for these companies in periods of high inflation.

Development of the model has shown that the covariance matrix, unlike historical rates of return, has great predictive power. Feeding the model with historic data then makes possible a very high degree of protection against the threats Haugen had previously identified. The trick in assembling the portfolios highly correlated with inflation and/or interest rates is to do it while minimizing volatility, and the details of the model remain proprietary. Haugen commented that one can specify the desired betas with respect to interest rates and inflation, specify constraints on the weightings in the portfolio, and then minimize volatility.

His concluding comments were that it is possible to identify the genuine risks faced by pension fund plan sponsors; and it is possible to control and trade off protection against these risks. All of this can be done without any concern for matching indexes of stocks or any other assets, and indeed makes such matching totally unnecessary.

William W. Jahnke, Chairman, Vestek Systems, began by contrasting the practice of indexing with three of its competitors: the traditional active management constituency, those who exploit market anomalies, and the proponents of the Dividend Discount Model. The traditional active management group is the one of the three that has been most scrutinized by critics. Studies have shown poor results relative to the market while other studies have shown little correlation in the best performing managers from one time period to another. Active managers tend to perform better compared to indexes when small companies do well. But the indexers are already venturing into small stocks, making it that much harder for active managers to beat them. There have been fewer critiques of those who exploit market anomalies, but Jahnke guessed that as the investment community moves up the learning curve, the opportunities for exploiting market anomalies are likely to disappear.

Jahnke devoted the balance of his presentation to a description of some research he has undertaken on the proponents of Dividend Discount Models. He has identified 31 organizations making use of DDMs. Of this group, 17 are participating in a study he is conducting; 4 have indicated that they will participate; while the balance are unable or unwilling to participate or have not yet been contacted.

Among other things, Jahnke is seeking to find out how well the DDMs have performed,
and what factors make for success. He reported some statistics he has already assembled.

Among the 17 firms participating so far in the study, 6 are brokers, 6 are managers, 3 are service firms, and 2 are managers who prefer to remain anonymous. He had inquired as to the source of the forecasts being used in the DDMs, and displayed a breakdown showing among the 17 firms the use of IBES, Value Line, and analysts within the firms.

He has begun to assemble performance data, and reported a few results. For the 19 DDMs maintained by the 17 firms, the average excess return shown by the most attractive quintile (excess to the average for stocks in the universe) has been 2.4% while the average for the 5th quintile (the worst stocks) has been -4.3%. Against the market, the average excess return for the first quintile was 3.3% while that for the 5th quintile was -4.8%.

For the 133 DDM years represented by the complete set of data for the 19 models operated by 17 firms, over the 1973-89 period, Jahnke had tabulated 53 major wins (in which the first quintile excess return was 5% or greater), 10 wins (for which the first quintile excess return was 3-5%), 14 ties (for which the first quintile excess return was 0-3%), 35 losses, and 21 major losses. He had also tracked this distribution of wins and losses year by year, to discover that in the 1970s the models seemed generally to work quite well, with performance becoming rather mixed in the early 1980s, turning perverse in the mid to late 1980s, with 1988 standing out as a rather good year.

A correlation of wins and losses with the source of forecasted data suggested that in the early 1980s better performances were achieved when the forecasts were done by analysts within the firm than when forecasts came from IBES. But during the latter half of the 1980s the results were more even, with the IBES forecasts perhaps performing better.

Jahnke closed with the promise to continue the work and a request for participation from any who could provide information on Dividend Discount Models.

99. ANOMALIES, INEFFICIENCIES AND ACTIVE EQUITY MANAGEMENT: PRACTICAL APPROACHES
(Fall, 1987)

George M. Douglas, First Vice President, Director of Quantitative Research at Drexel, Burnham, Lambert Inc., described his presentation as a review of quantitative valuation work at Drexel over the last five years, seeking inefficiencies in the stock market, with an emphasis on the most recent work which is based on the Arbitrage Pricing Theory.

The first model he discussed was the traditional dividend discount model, which at Drexel is based on a 3 period framework, covering rapid growth, maturing growth, and full maturity. Analyst forecasts are used to establish the expected growth rate. The model has led to somewhat mixed results, and Douglas indicated some dissatisfaction with the value added. The problem lies not so much with the model as with the forecasts.

Douglas next discussed a relative valuation model, preferred by most analysts to the dividend discount model. Various characteristic ratios are tracked over time, and a "channel" is established to identify when a ratio turns abnormally high or low. The model avoids explicit forecasting, and this is part of its appeal. But Douglas pointed out that in using the model one is always anticipating a return of an abnormal ratio to a normal level, so that there is always an implicit forecast being made. One cannot escape forecasting, and it seemed worthwhile to understand the consensus earnings forecast and changes in that consensus. Douglas presented some examples of the direction of change in the IBES mean earnings forecast, for a number of companies over periods of several years. It was clear that there were distinct patterns: for some years changes in earnings forecasts would be almost all positive, while during other years they would almost all be negative. Out of the changes in the mean consensus forecast, Drexel had developed its Forecast Risk Model. The object is to predict future changes in the consensus earnings estimate. The model has 3 components: trailing changes in the consensus for the last 3 months, the most recent actual quarterly earnings figure compared with the consensus, and the market response (in price and volume) to the last report. These components are represented by seven distinct variables carrying different weights. The model has generally worked quite well.
Douglas went on to discuss the matter of earnings surprise. Comparing reported earnings with the consensus forecast, one finds that in late 1986 the forecast had tended to overstate actual earnings, while for the first 9 months of 1987 the forecast has tended to underestimate actual earnings. Earnings surprise for the third quarter of 1987 does vary substantially by economic sector and by market capitalization. And there does appear to be a clear relationship between relative price performance and predicted forecast revision.

The newest work at Drexel is on a model related to the Arbitrage Pricing Theory. The object is to analyze stock price behavior, attributing the behavior to the factors responsible for it. In the Drexel model price performance is attributed to 20 factors, and these factors have been at least tentatively identified. The most important factor is the stock market itself. Other factors are interest rates, gross national product, inflation, and a number of industry segments.

Douglas described an application of the model to better understand the performance of low price/earnings stocks. In 1987, high price/earnings stocks generated high returns, in contrast to their relative performance in some earlier years. One thousand stocks were ranked and divided into deciles by price/earnings ratio. The lowest decile was then treated as an equally weighted portfolio and the returns of the stocks in that decile were attributed to the previously identified factors. It turned out that 91% of the relative return could be attributed to systematic factors, and only 9% to stock selection or company specific factors. The predominant systematic factors were interest rates, gross national product, and inflation. The low price/earnings stocks had a high exposure to interest rates, a low exposure to gross national product growth, and a low exposure to changes in inflation. All of these exposures worked against relative performance, so now we know why the low price/earnings stocks did not do well in 1987.

Douglas explored the same methodology in identifying the factor exposures that are inherent in a strategy of purchasing small market capitalization stocks. The same analysis can be applied to the results of use of the forecast risk model and to high yield equity portfolios.

He closed with some comments on difficulties in estimating risk in the forecast risk model, and ways in which Drexel proposes to deal with these.

100. THE ARBITRAGE PRICING THEORY AND MARKET ANOMALIES (Fall, 1987)

Bruce N. Lehmann, Associate Professor in the Department of Economics and Graduate School of Business at Columbia University, and David M. Modest, Professor in the School of Business Administration at the University of California at Berkeley, distributed a summary of their presentation entitled The Arbitrage Pricing Theory and Market Anomalies. Lehmann began by displaying a graph of average weekly returns over the period 1963 through 1982 for stocks divided into quintiles by three measures: market value, dividend yield, and own variance. The small capitalization stocks showed much higher returns than the large cap stocks. The low dividend yield stocks had high returns; and the high variance stocks showed high returns. With returns for the month of January excluded, the variation across quintiles was reduced, but the effect was still there. Lehmann asked why these differences in returns should exist, and argued that the Capital Asset Pricing Model cannot provide an explanation. The beta coefficients across the quintiles simply could not differ enough to explain the rate of return differences.

Factor models have become a popular alternative to the CAPM. It seems natural to associate characteristics of stocks and portfolios with their investment performance. Stocks that are similar when judged by a number of characteristics or factors might be expected to perform similarly, while stocks displaying different characteristics might be expected to perform differently. A factor model for stock returns takes the following form:

$$R_{it} = a_i + \sum_{k=1}^{K} b_{ik}R_{kt} + e_{it}$$

where $k$ is the number of factors, $R_{kt}$ is the percentage return on the $k^{th}$ factor or sector portfolio, the terms $b_{ik}$ reflect the degree to which the $i^{th}$ security's return typically respond to the returns on the $k^{th}$ factor or sector portfolio, and $e_{it}$ is the idiosyncratic (that is, security specific) portion of the $i^{th}$ security's
return. For a large and well diversified portfolio, the equation is:

\[ R_{pt} = a_p + \sum_{k=1}^{K} b_{pk}R_{kt} \]

since there is no exposure to idiosyncratic risk. We say that stocks are "similar" if they have similar exposure to the same factors. Referring to the equation above, this means that for each stock the value of \( b_{ik} \) is the same.

Lehmann now brought in the argument of the Arbitrage Pricing Theory to the effect that if the values of \( b_{ik} \) are the same for a number of stocks, their prices (expected rates of return) should be the same. Furthermore, if one can find a way to eliminate (by a short sale, for example) the factor risks, and if we have sufficient diversification to get rid of the error term, we should be left with only the constant term in the equation and the result must be the risk-free rate. What Lehmann and Modest had done was to test this model on the return variations for market value, dividend yield, and own variance, to see if those variations could be explained.

The methodology used was maximum likelihood factor analysis, using cross-sectional samples of 750 stocks.

Modest continued the presentation, showing a comparison of 5 attempts to explain the anomalies previously referred to. Two attempts made use of the APT, using 5 factors in one case and 10 factors in the other. In both cases the APT model had been based upon minimizing idiosyncratic risk. Three attempts were based upon the CAPM, one using an equally weighted New York Stock Exchange Index, a second using an equally weighted New York Stock Exchange and American Exchange Index, and the third using a value weighted New York Stock Exchange and American Exchange Index. The worst performer was the method using the value weighted index, although this index worked fairly well for the quintile of largest companies. Both applications of the APT dominated all 3 applications of the CAPM. The 10 factor model performed a little better than the 5 factor model, but not by very much.

The research had gone further, to compare different applications of the APT. Using portfolios of 30 securities (as had been the case in much of the earlier work with the APT) produced much worse results than using portfolios of 750 securities. There were small differences in results between the use of the maximum likelihood technique and the principal components technique. There were further small differences depending upon the choice of minimizing idiosyncratic risks and weighted least squares. The former appeared to do a little better than the latter.

Overall, none of the APT applications performed perfectly. That is none was able to completely explain the differences in rates of return across the five quintiles sorted on three characteristics. But the best application performed quite well. The last part of the reported research had to do with measures of how good the tested models were to the "perfect benchmark". The perfect benchmark would be the portfolio of the sorted portfolios that can perfectly explain expected returns, which we must assume are equal to actual returns. Using a methodology developed by Shanken, Kandel and Stambaugh, Lehmann and Modest had calculated the implied correlations between their models and the perfect benchmark. They showed these correlations for the five factor APT model and for the value weighted and equal weighted CAPM models. For the portfolios ranked by own variance, the implied correlation for the APT model was virtually 1.0. For the size ranked portfolios and the portfolios ranked by dividend yield, the implied correlations were lower, but better for the APT model than for the CAPM models.

101. SIZE AND INDUSTRY RELATED COVARIATIONS OF STOCK RETURNS (Fall, 1987)

Gur Huberman, Professor at the Graduate School of Business of the University of Chicago, distributed a paper by himself and Shmuel Kandel and G. Andrew Karolyi entitled Size and Industry Related Covariations of Stock Returns. He began his presentation with the commonly observed phenomenon that there are size related differences in mean rates of return on stocks. Keirn, and Lehmann and Modest had already reported research on this phenomenon in earlier presentations at the seminar (see summaries 92 and 100). The Capital Asset Pricing Model had proved unable to explain the size related differences in rate of return. Huberman's research undertook to find out whether the Arbitrage Pricing Theory can explain
the phenomenon. He worked with monthly rates of return from 1964 through 1983 for New York Stock Exchange stocks. The companies were randomly divided into four mutually exclusive portfolios, and each portfolio was divided into five size quintiles each year. Each quintile then constituted an equally weighted subportfolio. Rates of return were calculated for all twenty cells, and then correlation analysis was performed. The correlations between returns of portfolios with similar size were higher than the correlations between portfolios of different size. The relationship was generally monotonic, so that the larger the size difference between two firms, the smaller the correlation of the returns on their stocks.

The next question investigated was whether the size related correlations persist after controlling for marketwide price movements. Regressions were run following the market model, using a value weighted market index and an equally weighted market index. Correlations among the residuals of the market model were then calculated. The correlations among residuals of portfolios of a similar size were high, while the correlations of residuals of portfolios of different sizes were either close to zero or negative.

Huberman’s conclusion was that applying factor analysis will explain the size effect. But he had no explanation for why there are size-based factors. One possibility was a correlation between size and industry, so that the factor underlying the size effect might be industry classification. The market model regressions were replaced by a set of regressions whose explanatory variables were the returns on 19 equally weighted industry portfolios. Once again, correlations of the residuals indicated that returns on stocks of firms of a similar size are positively correlated even after controlling for correlations of returns induced by industry effects. The size effect then cannot be explained as an industry effect.
STOCK VALUATION - MODELS

102. THE PRICING OF COMMON STOCKS (Spring, 1990)

Myron J. Gordon, Professor of Finance at the University of Toronto, distributed a paper entitled The Pricing of Common Stocks. He described intrinsic value models as explaining different prices among stocks on the basis of earnings, investment policies, financing policies, and business risk. There are three purposes for intrinsic value models: to discover pricing errors in stocks on the basis of public or private information; to discover how stock prices change with investment and financing policies of corporations; and to discover what policies will maximize share prices.

Gordon traced some of the history of intrinsic value models, including his own, the models of Modigliani and Miller, and those of Malkiel and Cragg. He presented the original Gordon model, which was intended to give economic content to the dividend discount model proposed back in 1938 by J. B. Williams. The model takes the form:

\[ P = \frac{D}{K - G} = \frac{(1 - B)Y}{K - BR} \]

where:
- \( P \) = share price
- \( D \) = dividend per share
- \( K \) = return on share investors require
- \( G \) = expected growth rate in dividend and price
- \( Y \) = earnings per share
- \( B \) = fraction of earnings retained
- \( R \) = rate of return on investment

He turned next to the Modigliani and Miller model which takes the following form:

\[ P = \frac{Y + Q(R - K)}{K(K - QR)} \]

where:
- \( P \) = share price
- \( Y \) = earnings per share
- \( K \) = return on share investors require
- \( Q \) = equity investment/earnings
- \( R \) = rate of return on investment

In describing this new model, Gordon said that it proposed that investors buy earnings but that what they will pay for $1 of earnings increases with the extent to which the earnings are reflected in the dividend or in appreciation through growth. Hence the price per dollar of earnings increases with both the growth rate and the dividend payout rate, and the price to earnings ratio decreases as leverage or other sources of risk rise. He believed this model combined the best features of his original model and the Malkiel and Cragg model. He anticipated that with forecasts from IBES or similar sources this new value would do an excellent job of explaining the variation in price among stocks.

103. CHANGES IN CONSENSUS EARNINGS ESTIMATES AND THEIR IMPACT ON STOCK RETURNS (Spring, 1990)

Langdon B. Wheeler, President of Numeric Investors L.P. distributed a paper...
entitled Changes in Consensus Earnings Estimates and Their Impact on Stock Returns. He began his presentation by discussing why changes in earnings estimates matter. If one had had perfect foreknowledge of quarterly revisions of consensus earnings forecasts published in the IBES service, from the first quarter of 1981 through the fourth quarter of 1989, and had sorted the stocks into quintiles at the beginning of each quarter on the basis of the estimate changes coming up in that quarter, one would have found a spread of 11.88% between the returns on the top quintiles and the returns on the bottom quintiles. Further, results were positive in every individual quarter, and strengthened in 1988 and 1989. When the quarterly spreads are linked, the rate of return from buying the top quintile and selling the bottom quintile approaches 50% per year.

Wheeler next explored practical ways to predict changes in analysts' forecasts. Since adjustments to forecasts appear to take place slowly (for reasons he discussed), one might expect to pick up trends in earnings forecast revisions.

He talked about the interaction between earnings surprise and revisions of earnings estimates. Earnings revisions generally anticipate earnings surprises, and stock prices begin to adjust before the earnings revisions. But revisions follow earnings surprise as well. There is a tendency for revisions to the consensus to cluster in the few weeks immediately after an earnings announcement.

There are reasons to expect a trend in revisions of earnings forecasts, and the next question is how to exploit this trend. One method is to examine changes in the mean forecast over one month, to rank the revisions, divide them into quintiles, and buy the top and sell the bottom quintiles. Wheeler reported a spread of 1.42% as the mean monthly return following this strategy. Making use of changes over the preceding three months brought the spread up to 1.60% per month. The standard deviations in the two cases were 1.80% and 2.01%. Another strategy involves identification of outlying estimates. This involves examining changes in the high or low estimates rather than changes in the mean. Using changes in the high estimate over one month, the spread from the top to bottom quintile was .98% with a standard deviation of 1.20%. Making use of changes in the low estimate gave very similar results. Making use of changes in both the high and low estimates led to a spread of 1.24% with a standard deviation of 1.49% per month. Still a third methodology examines the number of rising or falling estimates. Here the mean monthly spread from top to bottom quintile was 1.44% with a standard deviation of 1.72%.

Wheeler then reported the results of the use of a proprietary multi-factor model. The mean monthly return for the top to bottom quintile spread was 1.66% with a standard deviation of 1.97%. The model produced somewhat better results when the stocks were sorted into 25 4% fractiles rather than into quintiles. The spread from the top 4% to the bottom 4% was 2.91% per month with a standard deviation of 3.13%.

He showed some results of testing his model -- the Estrend Model -- over the 1981 through 1989 period. While the overall monthly mean return was 2.91%, there were a number of negative months. On a cumulative basis, the model substantially outperformed the S&P 500.

Wheeler had shown that perfect foresight of earnings estimate revisions would have lead to profits in every quarter, but his model had clearly led to some unprofitable periods. He had calculated quarterly information coefficients for the Estrend Model, against the information coefficients corresponding to perfect foreknowledge. In general, there was a clear correlation between the two, but three quarters stood out in which the market responded to actual estimate revisions but the Estrend Model did not predict these revisions. Wheeler had conducted some tests of seasonality, and it appeared that the model tended to work poorly in January and August. He guessed that the problem in January may have to do with tax loss selling.

As between small and large cap stocks, Estrend was more than twice as effective in predicting returns for small cap stocks than it was for large cap stocks. It also turned out that Estrend was much more effective for stocks with fewer analysts than for stocks with more analysts. And the model proved to be more effective as the earnings uncertainty increased (uncertainty measured as the standard deviation of the fiscal year one estimates divided by price). Finally, the success of the model did vary among industries. Consumer cyclicals seemed to offer the best results.
104. SELECTING SUPERIOR SECURITIES (Fall, 1987)

Mark R. Reinganum, Phillips Professor of Finance at the University of Iowa, distributed a paper entitled Selecting Superior Securities. In summarizing his results, he observed that he had used data for the time period 1970 through 1983 to establish a formal stock trading rule and had tested the rule over the same time period, finding it to be highly successful. He then applied the same trading rule to data for the period 1984 through 1986 and found the rule continued to perform successfully. The stocks selected showed an average 22% excess return over the market at the end of one year and a 36% excess at the end of two years.

The research strategy followed four steps. First, Reinganum identified what he called stock market winners, using a publication by William O'Neil & Co. identifying the most successful stock investments over the period 1970-1983. Next, he looked for patterns in fundamental and technical data for these stocks during the eight quarters preceding the quarter in which it would have been advantageous to buy. The third step was to devise a trading strategy based on these data and test it on another set of firms over the same base time period. And the fourth step was to validate the strategy in a second time period.

Reinganum devised five categories of variables. The first consisted of what he called smart money variables, measuring the participation of professional managers and insiders in trading in a particular stock. These variables turned out not to be very helpful. His second category consisted of valuation variables, and he tested a price/book value ratio, a price/earnings ratio, market capitalization, beta, and share price. Of these, only the price/book value ratio proved useful. His third category consisted of technical variables. He found industry group rankings not to be helpful, but relative strength rankings were, as was ranking by Datagraph Rating, a proprietary rating system of William O'Neil & Co.. His fourth category included earnings and profitability data. He found pretax profit margins to be a useful measure, as well as the five year quarterly earnings growth rate and the acceleration in earnings growth. Finally, his fifth category included the number of common shares outstanding, which he found to be helpful, average daily trading volume which proved not to be helpful, and the ratio of the price at the indicated time of buying to its maximum during the previous two years, a ratio that did prove helpful.

The trading strategy Reinganum developed then consisted of applying 9 filters. The price/book value ratio was to be less than 1. Five year quarterly earnings growth was to be positive. There was to be quarterly earnings acceleration. There was to be a positive pretax profit margin. The number of shares outstanding was to be less than 20 million. The relative strength was to be greater than 70 and increasing. The Datagraph Rating was to be greater than 70. And the stock price was to be within 15% of its high over the preceding two years. After removing the previously identified winning stocks from his sample, Reinganum had data remaining on 2000 companies for the time period 1970-83. Applying his series of 9 filters he identified 453 buy signals for 319 stocks. For each buy he calculated the return on the stock for the succeeding 8 quarters, and compared that return to the return on the S & P 500 index. The mean return on his buys was 50% better than the S & P 500 index return. He tried reducing his set of nine criteria, and found that eliminating the Datagraph Rating did not significantly reduce the profitability of the trading strategy, while elimination of any other variable did have a significantly negative affect.

When the model was applied to the 1984-86 period, 59 buy signal were generated. The stocks selected experienced excess returns of 36% over the S & P 500 return at the end of a 2 year holding period.

Reinganum made no claim that he had identified the most important characteristics of stocks. And he emphasized that his trading strategy did not favor small market capitalizations, low share prices, or low price/earnings ratios. Nor was his strategy "contrarian" in the sense of choosing stocks that had recently experienced price declines. The excess returns achieved by the trading strategy, however, were very impressive.

105. VALUATION MODELS -- THE PRACTITIONER'S VIEW (Fall, 1986)

Martin L. Leibowitz, Managing Director -- Bond Portfolio Analysis, Salomon Brothers Inc., introduced the valuation portion of the Fall Seminar. James L. Farrell, Jr., MPT Associates, Inc., and Jack L. Treynor, President, Jack L.
Treynor, Inc., distributed a detailed outline covering four major topics. These were an introduction to valuation models, the evolution of systematic security valuation, income oriented approaches to modeling, and asset oriented approaches. Farrell began by dealing with the first three topics, and Treynor concluded with a discussion of the fourth.

In his introduction, Farrell discussed the benefits to be derived from valuation models, the criteria for "good" models, and the current need for better models. Good models are characterized by an analytical scheme that makes sense, by simplicity, and by interactive characteristics that encourage testing and particularly sensitivity testing. Good models also work across a wide universe of securities and ultimately deliver investor profits. With respect to the need for better models, Farrell commented that he felt existing models are not adequate to deal with the mergers, restructurings, and leveraged buyouts that are common today.

In tracing the evolution of systematic security valuation, Farrell began with Graham and Dodd, and what might be called intrinsic value investing. For all the strengths of this approach, it suffered from two deficiencies. The analysis was based upon accounting data, and recent work has suggested that there are serious weaknesses in valuation based upon accounting data. And the Graham and Dodd approach did not easily accommodate growth.

Turning to his third major topic, income based approaches, Farrell began with the dividend discount model. The perpetual growth version of this model sets price or value equal to dividend divided by discount rate minus expected growth rate. Rearranging the terms gives the familiar expression for expected return equal to dividend yield plus expected growth rate. Farrell commented that the model is particularly useful for establishing the expected return on the market as a whole and for classes of stocks with rather stable growth rates, such as utilities. But for most individual common stocks, we need a somewhat different model, and the three stage dividend discount model is one commonly used.

The three stage model considers growth over a fairly short horizon, long enough to accommodate an economic cycle, followed by growth over a transition period of perhaps five to twenty years, followed by growth to perpetuity in what might be called the company's residual or mature stage. This model suffers from a high sensitivity of results to input data that are difficult to supply and that may well include some biases.

A variation on the dividend discount model is the price earnings or payback model. One advantage of this variation is that estimates are required only of the price/earnings ratio and the earnings growth rate. And the model is particularly well suited to evaluating growth stocks. Its results, however, are not very precise and it does not provide an explicit expected rate of return. Farrell discussed three further variations on the dividend discount model, including the T model that had been presented by Tony Estep at the Q Group Seminar in the Fall of 1985. All three models provide explicit estimates of rates of return. All, however, call for input estimates that are often difficult to make, and perhaps more important, they are dependent upon accounting data.

Commenting on the basic dividend discount model, Farrell reviewed a number of its deficiencies. Estimating the dividend on a stock, or the dividend payout ratio, introduces a number of complications and a major source of error appears to lie in the tendency to underestimate future dividends. This occurs primarily in cases where a high growth company, with a low dividend payout, changes into a lower growth company with a high payout. The bias of the dividend discount models was discussed by Richard Michaud at the Q Group Seminar in the Spring of 1985. Problems of input errors, and ways of dealing with them, were discussed by Dan Rie at the Q Group Seminar in the Fall of 1985.

The discount rate, or required return, can be decomposed into seven elements. First is a risk free real return, and second an inflation premium, and these elements will be common to all stocks. For each stock there will be a risk premium which consists of five components: interest rate risk, purchasing power risk, business risk, financial risk, and liquidity risk. Farrell went on to discuss these risks, and some of the research that has been undertaken to explore their identification and measurement.

Treynor continued the presentation with a discussion of models for asset valuation. In his presentation at the Spring, 1985, Q Group Seminar he had set out some models for asset valuation. At this seminar he proposed to focus on the concepts rather than the models themselves.
He began by proposing that there are two sources of cash flow in a firm. One is production, and the scarcity value of plant. The other is market franchise. In explaining the importance of the scarcity value of plant he observed that companies make two kinds of production decisions. The first concerns how much plant to build, and the second concerns how much to produce with that plant. While there may be collusion among companies with respect to the first decision, there will rarely be any with respect to the second. As a result, companies will tend to push production very close to the competitive level. A second important proposition is that while demand may be very hard to predict, changes in supply are relatively easy to predict. He illustrated how one might construct the supply curve.

In the traditional economist's diagram, the supply curve rises from lower left (low price and low supply) to upper right (high price and high supply). The increase in supply takes place as more and more producers provide output, with the most efficient producers coming in first and the least efficient coming in last. New plant will be more efficient than existing plant, so that new plant comes in at the lower left end of the curve, and pushes the entire curve to the right. Since new plant does not affect the demand curve, the marginal cost represented by the intersection of the demand and supply curves will decline. One can now identify the "scarcity rent" in plant. An efficient plant will have a variable unit production cost below the marginal cost for the industry, and since price is equal to this marginal cost, that plant will earn a "rent." But as other plant is constructed over time, the rent on that particular plant will shrink as the supply curve shifts and the price comes down towards the plant's variable cost. The valuation process involves identifying the year by year scarcity rent for a company, and then discounting the series of those rents. Treynor discussed the process of estimating the rents, which essentially requires estimating the number of years it will take for additional capacity to bring price down to the variable cost for the plant.

Next he turned to the value of the market franchise and proposed a law of two prices. At any point in time there will be in a market two prices for a product: a high price for the brand that is regarded as the industry standard, and a low price for any other brand. For any particular manufacturer, the number of customers who regard its brand as the industry standard will constitute that manufacturer's market franchise. The point here is simply that to the extent a manufacturer can establish a reputation for its brand as the industry standard it can exact a higher price from consumers than can a manufacturer that does not enjoy industry standard status.

A company then has a choice between developing industry standard status and marketing to a limited clientele at a high price, or not establishing industry standard status and manufacturing at capacity for all customers at a lower price. A few firms may be able to do both, but generally a firm must choose. The decision to achieve industry standard status, of course, involves substantial spending on marketing and sales. And maintenance of a franchise once earned involves constant marketing and sales expenditure. Determining the value of a firm's franchise is somewhat more complicated than determining the value of scarcity rent. The graph illustrates the case for three manufacturers, two enjoying a franchise and achieving a "leadership premium," and the third -- a "follower" -- enjoying no franchise. The graph shows a single supply curve and two demand curves, one for the follower's brand and the other for the leader's brand. The scarcity rent in plant is shown in the graph, above the supply line. The portion of the shaded area below the supply line represents production costs. The follower makes no marketing expenditures and reaps no leadership premium. The two manufacturers with established franchises each incur marketing expenditure and each reap a leadership premium. The net premium, after marketing expenditure, is shown in the top portion of the shaded area.

Having presented the method of analysis, Treynor turned to why his approach is necessary. He first observed that one cannot satisfactorily analyze the cash flows for a single company except in the context of its industry. The dynamics of his two cash flows -- scarcity rent for plant and market franchise -- are quite different. It is simply not practical to use a single method for estimating the combined cash flows. He commented further than accounting offers no procedure for determining the two cash flows, and indeed his methodology is evidence that investment analysis is quite distinct from accounting as a profession.
106. VALUATION MODELS -- THE ACADEMIC VIEW (Fall, 1986)

Stephen A. Ross, Professor, Yale University School of Management, presented the academic view on valuation models. It is difficult, he said, to separate valuation models from finance as a whole, since finance as a whole is primarily concerned with the problem of valuation.

Valuation seems always to concern a stream of cash flows. The flows are generated by an asset for which we do not have a readily observable market value. Finance theory does not offer much assistance in estimating the cash flows themselves; the theory focuses on the appropriate discount rate to use in reducing those flows to a present value.

So long as the future cash flows are certain, there is general agreement that the present value is determined by discounting the certain flows at a risk free rate of interest. This may seem a trivial case, but Ross pointed out that it provides a convenient opportunity to see the usefulness of the arbitrage approach. If the discounting yields a present value different from the market price of those flows, then an arbitrage opportunity would exist. The proposition that certain cash flows should be discounted at the risk free rate is then supported by a pure arbitrage argument.

When we turn to the case of uncertain future cash flows we have two alternative methodologies. The older approach, one not very popular at present, is to convert each uncertain cash flow into a "certainty equivalent" cash flow, and then to discount those certainty equivalent flows at a risk free rate. The second method, generally used today, calls for discounting the estimated uncertain cash flows (probably using the mean of the distribution for each flow) at a risk adjusted discount rate. It is that risk adjusted rate that we call the cost of capital.

Turning now to specific valuation models to determine the cost of capital, Ross divided them into supply and demand models. The dividend growth model, discussed by Farrell in the preceding session, is a supply model. The earnings/price model, also discussed by Farrell, is another supply model. Ross expressed a personal preference for supply models and particularly for the earnings/price model. Of the demand side models the Capital Asset Pricing Model was probably the earliest. It has been succeeded by consumption-beta models. While the supply side models work with dividends or earnings supplied by the firm, the demand side models work with what investors demand. In principle, both types of model should give the same cost of capital. In practice, we generally find they do not.

Supply side models enjoy the benefits of simplicity, but involve considerable difficulty in the estimation of a growth rate. The earnings/price model can be stated in a form that does not appear to require any predictions, and this can be regarded as a benefit. However, the model does depend upon accounting measures of earnings.

A third supply side model discussed by Ross is the Q model. The model is represented by the equation Q = M/B. M is the market value of the firm and B is the asset value which should in principle be the cost of replacing the firm's assets. If Q is greater than one we would conclude that the firm should be investing in more assets. And if Q is less than one than the firm should not. Ross posed the question whether if Q is not equal to one the market is wrong in valuing the firm's assets or the analyst is wrong in making a valuation estimate. One might expect substantial changes in market value to reflect changed estimates of the value of assets by the marketplace.

Returning to the Capital Asset Pricing Model, Ross discussed its assumptions and its strengths and weaknesses. The model is simple, it is quite definite with respect to the determinants of expected rate of return, and it is firmly founded on theory. Its weaknesses lie chiefly in the fact that we need beta coefficients based on the entire market for risky assets. Proposed refinements to the basic CAPM have taken the firm of an intertemporal CAPM and a consumption-beta approach. As a practical matter, it is virtually impossible to measure the betas for the consumption-beta model. And Ross expressed some skepticism that individuals actually adjust consumptions patterns to conform to the theory.

Moving on from the equilibrium models, Ross suggested that the future probably lies with arbitrage models. The arbitrage pricing theory is an example of arbitrage models, but not the only example. Option pricing models, including the Black-Scholes model, are arbitrage models and have been remarkably successful in
delivering values that are very close to prices in the marketplace.

Ross commented, however, that arbitrage pricing models are not nearly as successful in delivering expected rates of return or costs of capital. He does not expect any significant improvement in our ability to arrive at good estimates of cost of capital, simply because whatever the model used there is too much "noise" in the selection and estimation of inputs. At the same time he does believe that arbitrage models will give insights into the valuation process and are worth pursuing.
TRANSACTIONS COSTS

107. ESTIMATING THE COMPONENTS OF THE BID-ASK SPREAD (Spring, 1986)

Professor Lawrence R. Glosten of Northwestern University and Professor Lawrence E. Harris of the University of Southern California presented a paper entitled Estimating the Components of the bid-ask spread, based upon research supported by the IORF.

Harris began the presentation by pointing out that the bid-ask spread that is of interest is not the spread reported or even quoted by a specialist, but the spread reflected by actual transaction prices. He discussed the theory that explains two components in this spread. The first is a transaction cost component, and constitutes compensation for the capital and services of the specialist, plus the risk undertaken in maintaining a long or short position. The second component is an adverse selection spread, reflecting the expectation that those with superior information will take advantage of the specialist in trading with him, and the specialist will have to set the bid and ask prices to obtain from less informed investors compensation for losses to the better informed. The transaction cost component can be expected to lead to a transitory price change, but the adverse selection component can be expected to lead to a permanent price change since it represents a revision of expectations.

The general approach followed by the authors was to estimate the two components of the spread, and then to use these estimations as independent variables, to establish how each component relates to various observable characteristics of stocks traded. Harris discussed a number of the difficulties encountered in designing and testing a model. Stock prices are discrete. That is, generally they move in steps no smaller than 1/8 of one dollar. It is important in evaluating the spread to know whether a transaction was a purchase from the specialist or a sale to the specialist. Both of these points presented some difficulty, and Harris described how they had been dealt with.

The empirical work was done in two stages. The first involved a time series analysis of 800 successive prices for each of twenty stocks, starting December 1, 1981. The following equation represents the model:

\[ P_{t+1} - P_t = c(Q_{t-1} - Q_t) + PSI_t + \epsilon_t \]

where:

- \( P_t \) = price observed at time \( t \)
- \( c \) = transaction cost spread component
- \( Q_t \) = bid/ask indicator, 1 if ask, -1 if bid
- \( PSI_t \) = adverse selection spread component

The result of this first stage was an estimation of the average cost component and the average adverse selection component. These are shown in the following table:

<table>
<thead>
<tr>
<th></th>
<th>Ignoring Discreteness</th>
<th>Discreteness Considered</th>
<th>Partial Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average cost component ( c )</td>
<td>$0.0444</td>
<td>$0.0276</td>
<td>0.80</td>
</tr>
<tr>
<td>Average adverse selection component per 1000 shares, PSI</td>
<td>0.0113</td>
<td>0.0102</td>
<td>0.64</td>
</tr>
<tr>
<td>Cross-security average of the total average (time-series) spread = ( 2(c + PSI \cdot AVEVOL) )</td>
<td>0.1090</td>
<td>0.0669</td>
<td>0.67</td>
</tr>
</tbody>
</table>

Although Harris had discussed the discreteness issue, and the desirability of building into the model explicit treatment of the discrete nature of prices, it turned out that to complete the research allowing for discreteness would be prohibitively expensive in computing time. So the second stage of the research was completed ignoring discreteness in prices.

For the second stage, the researchers made use of the average values for the cost component and the adverse selection component of the total spread. These became, when divided by price, the dependent variables in the second stage. The second stage took the form of a cross-sectional analysis of 800 successive prices for 250 stocks. The price series represented approximately a week of trading for the more actively traded stocks, and up to ten months of trading for less actively traded stocks. The results of the research are
represented in the following four equations (with t-ratios in parentheses).

\[
\frac{c}{P} = -0.00335 + 0.115 \text{ WDSD} + 0.0124 \text{ INVNT} \\
\begin{array}{c|c|c}
-2.84 & 5.96 & 2.73 \\
\end{array}
\]

(Adverse selection component)/Price

\[
\text{AVG PSI/P} = 0.000172 + 0.000218 \text{ OC} - 0.00000000105 \\
\begin{array}{c|c|c}
4.48 & 1.17 & -2.00 \\
\end{array}
\]

\[
\text{NSH} + 0.0215 \frac{c}{P} \\
\begin{array}{c|c}
3.71 & \\
\end{array}
\]

Daily Average Number of Trades

\[
\text{NT} = 15.40 + 0.000398 \text{ NSH} + 466 \text{ AVGSP/P} \\
\begin{array}{c|c|c}
3.85 & 6.38 & 1.29 \\
\end{array}
\]

Average Volume

\[
\text{AVGVOL} = 0.848 + 0.0813 \text{ AH} - 449 \text{ PSI/D} \\
\begin{array}{c|c|c}
21.7 & 5.45 & -9.41 \\
\end{array}
\]

where WDSD = weekly return standard deviation

\[
\text{INVNT} = \frac{1}{\text{NT}} \text{ (inventory)}
\]

OC = ownership concentration, fraction of stock held by insiders

NSH = number of shareholders

\[
\text{AVGSP/P} = 2\left(\frac{c}{P} + \text{PSI/P}\right)
\]

In discussing the results of the research, Harris pointed out first that the average adverse selection component of the bid-ask spread is much smaller than the average cost component, and for the average trade (around 1,000 shares) the adverse selection component is economically insignificant. However, for large trades this component can be much more important. Second, there appears to be very little variation from stock to stock in the dollar level of the spreads. This suggests that a significant part of the transaction cost is a fixed cost per share of transacting. Finally, despite the uniformity of spreads, the cross-sectional regressions did appear to provide some explanation for both the transaction cost and adverse selection components.
VOLATILITY OF RETURNS AND PRICES

108. VOLATILITY: STATISTICAL MODELS FOR FINANCIAL DATA
(Fall, 1990)

H. Gifford Fong, Chairman, Gifford Fong Associates, offered some opening comments on the program for the Seminar and introduced Lawrence Harris, Associate Professor, University of Southern California School of Business, who had put together most of the program and introduced the first speaker: Robert. F. Engle, III, Professor and Chairman of the Economics Department, University of California-San Diego.

Engle distributed a paper entitled Valuation of Variance Forecasts with Simulated Option Markets, by himself and Che-Hsiung (Ted) Hong, and Alex Kane.

He began by commenting that his presentations in the past of volatility models have been essentially to academic audiences, and he anticipated that an audience of practitioners might better be able to judge the value of the models.

He observed that distributions of financial data show characteristics implying that volatility is forecastable. He went on to say that there will be changing over time. Beta coefficients will be changing over time. And since the prices of options depend upon volatility, we may need some new models for option pricing.

As an introduction to the forecasting models, he discussed the difference between a conditional mean and an unconditional mean, and between a conditional variance and an unconditional variance. The unconditional statistic is a constant. The conditional statistic is a random variable, incorporating all of the information available up to the time of estimation. The innovation in the methodology he was leading up to has to do with the use of conditional rather than unconditional variance.

The model Engle had proposed for specification of the conditional variance -- the ARCH or auto regressive conditional heteroskedastic model takes the following form:

$$h_t = w + \sum_{i=1}^{p} a_i e_{t-1}^2$$

where $$E_t = y_t - m_t$$

$$h_t$$ is the conditional variance estimated at time $$t$$, $$y_t$$ is the return in period $$t$$, and $$m_t$$ is the conditional mean estimated at time $$t$$. $$p$$ is the number of periods over which the regression is performed.

He went on to describe some variations on the ARCH model. The generalized ARCH model, or GARCH, incorporates lagged values for $$h$$, as well as lagged values for the error term. The exponential generalized ARCH model, EGARCH, uses the log of the variance instead of the variance itself. This model permits separation of the effects on volatility of negative from positive error terms. It turns out that negative error terms appear to have a greater effect.

Engle reviewed some of the properties of the ARCH model. The ARCH (1) model is simply the version of the model with a one period memory. In this case:

$$y_t = m_t + \epsilon_t$$

$$h_t = w + \alpha e_{t-1}^2$$

The model implies no serial correlation in error terms; it produces the fat tails that are known to exist in equity return distributions; it lends itself to t-tests and F-tests, and it permits tests for volatility clustering. To illustrate the advantages of the ARCH model over one based on unconditional returns and variances, he used the example of the risk premium for a six-month treasury bill over a three-month bill.

Engle turned next to the matter of predicting volatility. Our intuition might tell us that large surprises will lead to the expectation of more large surprises. If an increase in volatility is perceived to be only temporary, then the price decline resulting from the perception of increased volatility will be slight. If the increase in volatility is perceived to be permanent, then the price decline will be much larger. Engle added the comment that there is no reason to assume that volatility will be mean reverting.

He turned next to the paper, which describes the testing of twelve models for
predicting volatility. The first model -- the MA model -- simply estimates the future variance as the variance calculated from the most recent \( n \) observations. The OLS model assumes that the rate of return follows an auto-regressive process with a one period lag. The variance estimate is taken from the standard error of the regression. The third model is the ARMA model. As in the OLS model, the rate of return is assumed to follow an auto-regressive process. But the sample variance of the residual is also assumed to follow an auto-regressive process with a lag of one period. Finally, the GARCH model differs from the ARMA model in that the latter uses least squares while the former uses maximum likelihood. The four models became twelve, when each was used for three different sample time periods.

The models were applied to daily returns on the New York Stock Exchange Index, from July 3, 1962 through December 31, 1985. Each of the four models was given returns for \( n \) days from the past, and required to estimate the volatility one day ahead. There were three sample lengths for \( n \). First, \( n \) was the entire available set of past observations, but no less than 1,000. The sample then actually varied from 1,000 to 5,901 observations. The second sample length chosen was 300 days and the third was 1,000 days.

The task of the models then was to forecast the variance one day ahead. But it is impossible to observe the actual variance one day ahead, in order to judge the correctness of the forecast. The procedure for testing the forecasts made use of the Black-Scholes option valuation formula. An on-the-money option expiring on the following day was priced on the basis of the variance forecast produced by each model. It was assumed that each of the twelve models was used by an agent, and that the agents bought and sold options (put and call) among themselves on the basis of the option valuations derived from their volatility forecasts. The ultimate test of success was arriving at December 31, 1985 with a cumulative profit. Superiority in forecasting volatility would necessarily have led to superiority in valuing options.

It turned out that the ARCH models outperformed the rest. Interestingly, a strategy of using the average option value derived from all twelve models simultaneously was a close runner up.

109. INTERNATIONAL TRANSMISSION OF VOLATILITY
(Fall, 1990)

Yasushi Hamao, Assistant Professor, Graduate School of International Relations and Pacific Studies, University of California-San Diego, distributed a paper entitled *Correlations in Price Changes and Volatility Across International Stock Markets* by himself, Ronald W. Masulis, and Victor Ng.

Hamao's topic was the spillover effect of prices and price volatility among the three major equity markets: Tokyo, London, and New York. In the course of a day, the Tokyo market opens and closes before the London market opens. The London market opens next, and closes after the New York market has opened. The New York market closes, and the day ends. The question is the extent to which price changes and volatility changes in one market affect trading in subsequent sessions on the other two markets. The three markets were represented, respectively, by the Nikkei 225 Stock Index, the Financial Times-Stock Exchange 100 Share (FTSE) Index, and the S&P 500 Index. The rates of return for the indexes were computed three ways: close-to-close, close-to-open, and open-to-close.

One troublesome aspect of the return measurement had to do with the use of index prices at or near the opening of trading. In the case of the S&P 500 and the Nikkei Indexes, when individual stocks of the index have not yet opened trading, the previous day's closing price quotes are substituted in computation of the opening index. The FTSE Index does not present this problem, because firm quotes rather than transaction prices are used in computing the index. For most of the time series, Hamao reported that prices of the Nikkei index 15 minutes after the official open were used as the "open".

The statistical methodology used was the GARCH-M model. (The characteristics of the ARCH models were discussed in the previous presentation by Robert Engle.) The form of the model was:

\[
R_t = \alpha + \beta h_t + \gamma e_{t-1} + \epsilon_t
\]

\[
h_t = \delta + \eta h_{t-1} + \zeta e^2_{t-1}
\]

where \( R_t \) is the conditional return, \( h_t \) is the conditional variance, and \( \epsilon \) is the error term.
The first test was for volatility spillover in open-close returns. Rates of return were calculated for the open-close period for each index over the three year period April 1, 1985 to March 31, 1988. The model set out above was estimated for each market. One market was designated the "domestic" market. The most recent squared residuals were calculated for the two previously open foreign markets. These residuals can be interpreted as foreign "surprises" for the domestic market. The residuals from the previously open foreign markets were then included in the variance equation for the domestic market, and this expanded model was reestimated:

\[ R_t = \alpha + \beta h_t + \gamma \epsilon_{t-1} + \epsilon_t \]
\[ h_t = a + b h_{t-1} + c \epsilon^2_{t-1} + d_1 x_{t1} + d_2 x_{2t} \]

where \( x_{1t} \) is the squared residual from one of the foreign markets and \( x_{2t} \) is the squared residual from the other. The magnitude and t statistics for \( d_1 \) and \( d_2 \) were examined. It turned out that when the spillover effects were examined foreign market by foreign market, for the full sample period the impact of a volatility "surprise" in the most recent foreign market on the return volatility in the domestic market was statistically significant for all three markets. However, when only the pre-October 17, 1987 crash period was examined, only the spillover from New York to Tokyo was significant. When the effects of volatility "surprise" in the two previously opened foreign markets were considered together, for the full sample period it turned out that all three markets were affected except that Tokyo had no significant effect on New York. Over the pre-crash period, there was a significant spillover effect from London and New York to Tokyo. It seemed clear that the Japanese market was the one most sensitive to spillover effects from foreign markets.

Next, spillover effects on the conditional mean were examined. The model was changed to:

\[ R_t = \alpha + \beta h_t + \gamma \epsilon_{t-1} + \delta_1 y_t + \epsilon_t \]
\[ h_t = a + b h_{t-1} + c \epsilon^2_{t-1} + d x_t \]

where now \( y_t \) is the most recent foreign open-close return. Once again, reestimation of the model incorporating the foreign open-close return led to examination of the magnitude and significance of the \( \delta \) coefficient. It turned out that a high return in New York was followed by a high return in London, and a high return in London was followed by a high return in New York, but there appeared to be no spillover from Tokyo to London. When only the pre-crash period was used, the spillover from New York to Tokyo became much less significant.

The model was then adjusted to use noon-to-close S&P returns to eliminate any overlap between the New York and London markets. The significance of the spillover from London to New York disappeared. Hamao took this result as consistent with informational efficiency. That is, any information gained from a previous session in London should, according to theories of efficiency, be reflected immediately in New York, so that from noon-to-close there should be no spillover effect left.

Next, the spillover effects were tested on close-open returns. This test should catch the effects of one market on the next opening market at the time of the opening of that second market. It turned out that for all three markets, the most recent open-close return in the prior market has a large positive effect on the opening price in the next market. Conditional variances also displayed spillover effects, but the volatility spillover from Tokyo to London was weak.

In conclusion, Hamao pointed out that Tokyo appears to be affected by London and New York, but does not exert much influence on New York. He went on to discuss some research now underway, directed particularly at changes over time in the extent of volatility spillover.

110. THE VOLATILITY OF CURRENCY FUTURES RETURNS DURING TRADING AND NON-TRADING HOURS (Fall 1990)

Peter Kretzmer, Assistant Professor of Finance and Business Economics, University of Southern California Graduate School Of Business, distributed a paper entitled *The Volatility of Currency Futures Returns during Trading and Non-Trading Hours*, by himself, Douglas H. Joines and Coleman S. Kendall. He described the paper as a further attempt to explain the well-established fact that asset returns are more volatile in trading hours than in non-trading hours. He reviewed three papers on the subject. 
French and Roll had used evidence on common stock returns to show that these returns were 70 times as volatile during trading hours as in non-trading hours. They had proposed three possible explanations: that the release of public information is concentrated during trading hours, that private information is
incorporated into stock prices during trading hours, or that trading noise is present during trading hours. Their work appeared to rule out the first of these explanations. They compared volatility on regular business days when the stock market was closed to volatility on regular business days when the stock market was open.

In an earlier paper, Hertz, Kendall, and Kretzmer had worked with currency futures contracts to find some evidence that volatility in currency futures returns is influenced by public information released primarily during business hours. Specifically, what they found was that the ratio of the hourly return variance during trading time in five different currency futures contracts to the hourly return variance during non-trading time was positively related to the degree of overlap between the normal business hours of the country of the foreign currency and trading hours on the Chicago Mercantile Exchange, where the futures contracts were traded.

The present paper was designed to press further the search for the source of the volatility differences. The model took the form:

\[ r_{jt} = \lambda_{j} Z_{ut} + v_{jt} \]

where \( r_{jt} \) is the futures return in period t on currency j relative to the U.S. dollar, \( Z_{ut} \) denotes new information about the U.S. economy, and \( v_{jt} \) denotes new information about the economy of country j. \( \lambda_{j} \) is the sensitivity of the return to the new information about the U.S. economy.

Use of the model requires restriction of \( \text{cov}(Z_{ut}, v_{jt}) \) and \( \text{cov}(v_{jt}, v_{kt}) \) to be zero which may require the removal of more than one common factor (to produce \( v_{jt} \) that are country-specific and are uncorrelated with all other sources of information in the model).

The business hours hypothesis implies proportionality across currencies in the response of open-to-close returns relative to close-to-open returns to each common factor. Next, it is assumed that information about each country's economy arrives at a faster rate during the normal business hours of that country than during its non-business hours. More specifically, the variance per unit time takes on one value during normal business hours and \( \delta \) times that value outside that country's normal business hours.

The variance of the country's "country-specific factor" in the open-to-close model is \( k_{j} \) times its variance in the close-to-open model, where

\[ k_{j} = [h_{j} + \delta(6 - h_{j})] / ((9 - h_{j}) + \delta(9 + h_{j})) \]

and \( h_{j} \) is the number of business hours of country j that overlap with futures trading time on the CME. \( k_{j} \) is then a function of \( \delta \) and \( \delta \) is taken to be strictly a function of the hours during which trading on the CME overlaps the business day (8:00 a.m. through 5:00 p.m.) in the country whose currency future is traded. Kretzmer presented a table of values of \( \delta \) and of \( k_{j} \) for Canadian, U.K., German, Swiss and Japanese currency futures. It turns out that the actual variance ratios, taken from raw data, are not consistent with the values of \( k_{j} \) in the table. Evidently, the raw returns cannot be explained by the business hours hypothesis, and it is necessary to take out some common factor.

Ten years of daily returns on currency futures contracts for five currencies were analyzed. Both close-to-open returns and open-to-close returns were used. The covariance matrix for each application suggested that all currency futures returns react in a similar way to some common influences such as the U.S. information variable \( Z_{ut} \).

The business hours hypothesis of public information requires the imposition of some constraints. One is that the coefficients on the U.S. information variable in the open-to-close model are proportional to those in the close-to-open model and that the factor of proportionality lies within a certain range. It turns out that a \( \delta \) of 0.04 maximizes the likelihood in the fully constrained model. Testing the business hours hypothesis against the unconstrained model with the U.S. information factor and the country-specific factor indicated that the business hours hypothesis is rejected.

111. THE EQUITY TERM STRUCTURE:
THE ROLE OF VOLATILITY IN PRICING EQUITIES (Fall, 1990)

Michael Granito, Managing Director, J.P. Morgan Investment Management Inc. distributed a paper entitled The Equity Term Structure. He introduced his topic with the observation that the term structure for fixed income instruments is a familiar tool of analysis, and it seems natural to apply different discount rates to cash receipts
expected at different future points in time. Why then is it not intuitively obvious that there should be an equity term structure? One answer is that dividends are much harder to predict than fixed income receipts, and further there is no market in dividend futures. However, Granito observed that stocks are often valued as the present value of the dividend stream. And from this present value calculation one can back out a single dividend discount rate. If instead we backed out a series of discount rates, one for each future dividend, we would end up with a term structure. The equity and the fixed income term structures could be expected to take the same general shape, upward sloping as a general rule, with the yield on equity and fixed income receipts the same at the zero maturity end of the structure. Similarly, the equity term structures for companies with differing risk would show no yield spread at zero maturity, and a rising spread as maturity rises, until the spread becomes constant.

Granito discussed how the equity term structure might improve asset allocation. The equity risk premium, which is important to allocation decisions, depends upon maturity.

He turned next to the matter of calculating the equity term structure. For a single period, the expected return will be the sum of a risk-free rate plus risk premiums for the various risks perceived in the equity. Granito had chosen four economic factors to represent risk. These were inflation, real short rates, real dividend growth, and volatility. All four factors are expected to affect each other. Volatility is a particularly important factor. The model presumes an underlying volatility, and the volatilities of the other factors are proportional to this underlying volatility. Further, it is assumed that the underlying volatility is mean reverting.

Granito identified the sensitivities of a particular equity to the various factors as durations. For each factor then there is a required return per unit of factor risk, designated the "lambda" for that factor, so that the expected equity return is the risk-free rate plus lambda for the first factor multiplied by duration on this first factor, plus lambda for the second factor multiplied by duration for the second factor, and so on through the fourth factor. The values of lambda may depend upon the economic factors and time, but not on specific instruments. Further, the values of lambda are proportional to the underlying volatility.

Calculation of the term structure makes use of the following equation:

\[
\text{Market Value of dividend } D_t = \frac{E(D_t)}{(1 + y_t)^t}
\]

\(E(D_t)\) is the expected value of the dividend at time \(t\). \(y_t\) is the discount rate appropriate to the time horizon \(t\). Granito used option pricing theory to determine the market value. He combined this market value with his forecast of \(D_t\) and was therefore able to calculate \(y_t\).

He went on to discuss some of the characteristics and uses of the equity term structure. The equity risk premium can be identified, and the impact of changes in volatility on the equity risk premium can be identified. It is interesting that the equity risk premium turns out to depend upon volatility but not on any of the other three economic variables. Further, the equity risk premium is zero at zero maturity and approaches zero at long maturities. This is the result of assuming volatility to be mean reverting. A number of participants commented that the mean reversion assumption is highly questionable on the basis of some empirical work.

In concluding, Granito pointed out that the equity risk premium is influenced only by volatility and maturity. This is important in measuring security factor risk, in valuing equities and in determining the relative value of equities and bonds in asset allocation.

**112. STOCK MARKET VOLATILITY**

(Fall, 1990)

G. William Schwert, Gleason Professor of Finance, Simon School of Business, University of Rochester, distributed reprints of his article "Stock Market Volatility" published in the *Financial Analysts Journal*, May-June, 1990. He based his talk on the article, reviewing the history of stock market volatility and focusing attention on changes in this volatility over time and the possible causes of those changes.

A number of interesting conclusions could be drawn from a table showing the 25 highest and the 25 lowest daily percentage returns to the market portfolio, from 1885 through 1989. The data covered some 29,000 daily returns. It turns out that October 19, 1987 showed the most negative daily percentage
return, almost twice the next most negative percentage return, achieved on October 28, 1929. Schwert pointed out that the drop on October 13, 1989, much advertised in the financial press, was not among the 25 worst days. The best and worst days tend to cluster around specific phenomena. Over half are related to the stock market crash in 1929 and the Depression years through 1937. Furthermore, there are evident clusterings of best days with worst days. For example, the second worst decline was on October 28, 1929, the third worst was on October 29, 1929, and the second best day was October 30, 1929.

A second table showed the 25 highest and lowest monthly percentage returns, this time over the period 1802-1989. October 1987 was only the fifth worst month. September 1931 was the worst. April 1933 was the best. Once again, there tended to be clusterings of the best and the worst. For example, the 12th worst was September 1857, and the 7th best was December 1857.

A number of graphs plotted annual and monthly standard deviations. The annual standard deviations were based on monthly returns within the year, and the monthly standard deviations on daily returns within the month. It was clear that there have been periods of very high volatility. Generally these periods were related to times of economic stress. It was also clear that the 1980s, except for 1987, have not been a period of unusually high volatility.

A graph of the volatility in the S&P 500 Index and the volatility in the S&P Futures Returns showed that the futures returns are consistently more volatile, and were extraordinarily more volatile in October 1987. Schwert suggested that the futures contract price reacts more quickly to new information than does the price of the index itself.

For recent years, data are available from which it is possible to measure intraday volatility. Schwert had used 15-minute returns on the S&P 500, from February 1, 1983 through October 19, 1989. On the typical day the standard deviation is about 0.75%, and as might be expected some days, such as October 19, 1987, show much higher volatility. What shows up particularly clearly in the graph of daily returns is the clustering of volatility. These obvious changes in volatility point to the advantages of the ARCH volatility models that had been discussed in previous sessions at the Seminar.

Schwert's conclusion from all of the graphs was that volatility as measured by standard deviation of rates of return has been stable since the mid 19th century in the United States. The major exception was the great Depression period from 1929-1939. The graphs also showed that the high levels of volatility following October 19, 1987 were quite short lived. And the burst of volatility on October 13, 1989 was even shorter lived. Finally, futures returns have proved more volatile than stock index returns at times of large price movements.

Schwert suggested a number of reasons for slow changes in volatility. Changes in corporate and personal leverage could account for some of the change in volatility, but the connections appear to be rather weak. In particular, there appears to be no relation between margin requirements and volatility.

Schwert closed with an observation that had been expressed by other speakers, to the effect that large drops in stock prices appear to have greater effect on volatility than large increases. While we have no basis for predicting a reversal following a large drop, we do have a basis for predicting a greater change than would be signalled by a large rise in prices.

113. PROGRAM TRADING AND INTRADAY VOLATILITY
(Fall, 1990)

Lawrence Harris, Associate Professor of Finance and Business Economics, University of Southern California School of Business, distributed a paper by himself, George Sofianos, and James E. Shapiro entitled Program Trading and Intraday Volatility. He began his talk with some conclusions from his research. Program trading turns out not to be as threatening as might have been thought. Program trading is indeed correlated with intraday volatility, but there appears to be no reason for attributing causation to program trading. In any case, there are three explanations for the correlation. Part of it can be explained by the "bid-ask bounce". The S&P 500 Index at any point in time reflects the most recent transaction prices for the underlying stocks. These prices are probably somewhere in between the bid and ask quotes at the time the index price is published. Program trades almost always consist of all sell orders or all buy orders. They will therefore move the trade prices of the stocks they identify either toward the bid or toward the ask. In consequence, the index will move towards the bid or towards the
ask. Hence the bid-ask bounce, which can be a significant source of intra-day volatility but not a source for which program trading can be criticized.

A second contributor to the correlation between program trading and intraday volatility lies in the phenomenon of stale prices. The index reflects the prices for the most recent transactions. In some cases the bid-ask spread may have moved since the last transaction, so that the index has in some sense ceased to convey an accurate picture of the level of the market. The effect of a program trade may be to bring the transaction prices up to date, and hence to bring the index up to date. This refreshing of stale prices will also contribute to intraday volatility, but once again cannot seriously be considered a criticism of program trading. It turns out that even after allowing for bid-ask bounce and the effects of stale prices, there is still an association between program trading and intraday volatility.

The empirical work made use of two methodologies: event study methods and regression methods. First, the index itself was decomposed as follows:

\[ I_t = (I_t - Q_t^L) + (Q_t^L - Q_t^C) + Q_t^C \]

Index = Bounce + Staleness + Current Quote Midpoint

where \( I_t \) is the index of last trade prices, \( Q_t^C \) is the index of current quote midpoints, and \( Q_t^L \) is the index of last trade quote midpoints. The purpose of the decomposition is obviously to identify at any point in time the bounce and staleness elements in the index. Similarly, the basis was decomposed as follows:

\[ I_t - F_t = (I_t - Q_t^L) + (Q_t^L - Q_t^C) + (Q_t^C - F_t) \]

Basis = Bounce + Staleness + Midpoint Basis

For the event study analysis, the data identified in the decompositions above were arrayed around the times of the program trades. The trade and quote data consisted of all New York Stock Exchange trades and quotes in June 1989 for the stocks in the S&P 500 Index traded on the New York Stock Exchange. This sample included 457 stocks, comprising over 95% of the value of the index, and 2,346 program trades. A program trade is defined to include a trading strategy involving the simultaneous or nearly simultaneous purchase or sale of 15 or more stocks with a total aggregate value of $1 million or more. The event studies led to graphs showing the average values of the components of the index and the basis identified above, for leads of 1-50 minutes preceding the program trade and lags of 1-50 minutes following the program trade. Separate graphs were prepared for buy programs and for sell programs.

Harris discussed the results of his graphical analysis. In the case of both buy and sell programs, the futures price moves first, beginning its move earlier in the case of sell programs (30 minutes rather than 10 minutes before the program trade), declining in the case of the sell program and rising in the case of the buy program (with greater movement associated with the sell program), showing a small recovery within the 50 minutes following a sell program execution and showing virtually no recovery within 50 minutes following a buy program execution. The program trades then seem responsive to changes in the market, rather than responsible for those changes. And the volatility associated with program trading would therefore be fundamental volatility and not excess volatility.

The graphs of the basis show that program trades – probably index arbitrage – take place when the basis is large. The absolute basis reaches its largest value about 1 minute before the program trade.

Regression analysis was used to quantify the average relation between the value of a program trade and the associated change in the index. Results showed that a $125 million trade would be associated with a one index point change in the S&P 500 at a level of 325, and a $400 million trade would be associated with a 1% change. Buy programs were found to have about 2/3 the influence of sell programs on the level of the index.

The most important interpretation reached by Harris was that program trades appear to be related to changes in fundamental information, because the changes in index value associated with the program trades did not subsequently reverse. The futures market is the first affected, because it is the cheapest market for small orders. Large orders may appear to be cheaper in the futures market than in the cash market, but this is an illusion because part of the cost of trading in the futures market is compensation to arbitragers who ultimately provide the liquidity to the futures market. As a
result, futures trading causes volatility only if traders mistakenly believe that futures trading is always inexpensive. Such mistakes should be self correcting.
THE Q GROUP
The State-of-the Art
in Investment Management

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- AUTHORS INDEX
- SUBJECT INDEX
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April 28 –
An Introduction to Incentive Fees
Speakers: Eugene E. Record, Jr., Senior Vice President, Thorndike, Doran, Paine and Lewis
Mary Ann Tynan, Vice President, Thorndike, Doran, Paine and Lewis

Incentive Fees
Speaker: Mark Kritzman, Partner, New Amsterdam Partners

Panel Discussion
Panelists: Eugene E. Record, Jr.
Mark Kritzman
Lawrence E. Davanzo, Senior Vice President, Wilshire Associates
Andrew Rudd, Managing Director, BARRA
Jack Meyer, Treasurer and Chief Investment Officer, Rockefeller Foundation

Refunding Considerations for High Coupon Debt: Calls, Tenders, and Efficiency
Speaker: Andrew Kalotay, Vice President, Salomon Brothers, Inc.

Panel Discussion: Market Indices in the Asset Allocation Framework
Panelists: Robert E. Shultz, Director of U.S. Retirement Funds, IBM Corp.
David E. Seidel, Vice President Pension Fund Management, GTE Investment Management Corp.
Thomas M. Richards, Principal, Richards and Tierney, Inc.
Donald W. Phillips, Director, Investment Management, Ameritech Technologies
Marvin Damsma, Third Deputy Comptroller, City of New York

April 29 –
immunized Portfolios and Dynamic Asset Allocation
Speakers: Eric Pang, Assistant Director of Research, Gifford Fong Associates

Investment Rules, Portfolio Insurance and the Implications of Financial Cycles (The Ergodic Hypothesis)
Speaker: Michael R. Granito, Managing Director, J.P. Morgan Investment Management, Inc.

Trading and Hedging Bonds with Imbedded Options
Speakers: Richard Bookstaber, Vice President, Morgan Stanley & Co., Inc.
Joseph A. Langsam, Research Manager, Morgan Stanley & Co., Inc.

New Perspective on Asset Allocation
Speaker: Martin Leibowitz, Managing Director, Salomon Brothers, Inc.
April 30 –
Estimating the Components of the Bid-Ask Spread
Speakers: Professor Larry Glosten, Northwestern University
Professor Larry Harris, University of Southern California

High Yield Portfolios Revisited
Speaker: Professor Krishna Ramaswamy, Institute Research Coordinator
and Professor, The Wharton School

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Q AT 20: THE PAST IS PROLOGUE

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Speaker: Robert L. Whalen, CIGNA Investments, Inc.

Risk Management
Speakers: Edwin J. Elton &
Martin J. Gruber, New York University
Graduate School of Business Administration

Risk Management -- The Practitioner's View
Speakers: D. Don Ezra, Frank Russell Company
H. Russell Fogler, Aronson & Fogler

Market Efficiency/Inefficiency
Speaker: Robert Merton, Massachusetts Institute of Technology

Market Efficiency/Inefficiency -- The Practitioner's View
Speaker: William L. Fouse, Mellon Capital Management

October 7 –
Valuation Models
Speaker: Stephen A. Ross, Yale University

Valuation Models -- The Practitioner's View
Speaker: James L. Farrell, Jr., MPT Associates

Valuation of Contingent Claims
Speaker: Mark E. Rubinstein, University of California, Berkeley

Valuation of Contingent Claims -- The Practitioner's View
Speaker: Bernard Kroll, Kidder, Peabody & Company
Richard Bookstaber, Morgan Stanley & Company

October 8 –
Panel Discussion: Quo Vadis?
Robert L. Whalen
Edwin J. Elton
Martin J. Gruber
D. Don Ezra
H. Russell Fogler
Robert Merton

William L. Fouse
Dr. Roger F. Murray
Stephen A. Ross
James L. Farrell
Mark E. Rubinstein
Ed Thorp
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THE CHANGING FINANCIAL IMPACT OF PENSION PLANS

March 22 –
Words of Welcome - A Case of Mistaken Identity
Speaker: Peter L. Bernstein, Peter L. Bernstein, Inc.

March 23 –
Introduction to the Program
Speaker: Martin Leibowitz, Salomon Brothers, Inc.

A Primer on FASB 87
Speaker: Lawrence Bader, Salomon Brothers, Inc.

Legislative Initiatives
Speaker: Dallas L. Salisbury, Employee Benefit Research Institute

Investment Implications Within the New Liability Framework
Speaker: Irwin Tepper, Irwin Tepper Associates

Integrated Asset Allocation
Speaker: William Sharpe, Sharpe-Russell Research, Inc.

March 24 –
The Evolving Nature of the Pension Claim in the U.S. and Globally
Speaker: D. Don Ezra, Frank Russell Company

Pension Plan Performance and the Economic Irrelevance of FASB 87
Speaker: Richard A. Ippolito, Pension Benefit Guaranty Corp.

How Sponsors are Dealing with the New Environment
Panelists: Robert Shultz, RJR Nabisco, Inc.
Arthur Williams III, Simms Capital Management, Inc.
William N. Searcy, Monsanto Co.
Chuck F. Lemons, Manville Corp.
Michael J. Gallimore, IBM Canada, Ltd.

The New Accounting Perspective
Speaker: Pat McConnell, Bear, Stearns, Inc.

March 25 –
Conditional Allocation Policies for a Self-Insured Pension Fund
Speaker: Andre F. Perold, Graduate School of Business Administration, Harvard University

FASB 87/88: The Intent and the Prospect
Speaker: Douglas A. Love, BEA Associates

OCTOBER 18-21, 1987
FINANCIAL INNOVATIONS AND THEIR IMPACT ON MARKET BEHAVIOR

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Financial Markets
Speaker: Donald Weeden, President and CEO, Weeden & Co.
October 19 – Investment Markets: More Volatility and Less Efficiency?
    Introduction to the Program
    Speaker: Eugene E. Record, Jr., Senior Vice President, Thordike, Doran, Paine & Lewis

S&P 500 Futures and Cash Stock Price Volatility
    Speaker: Lawrence Harris, Assistant Professor of Finance and Business Economics, University of Southern California

The Dynamics of Stock Index and Stock Index Futures Prices
    Speaker: Robert Whaley, Associate Professor of Finance, Fuqua School of Business, Duke University

Bond Market Volatility: Cause and Effect
    Speakers: Laurence Weiss, Vice President, Goldman, Sachs & Co.
              Robert Litterman, Vice President, Goldman, Sachs & Co.

The Impact on Market Liquidity of Program Trading and Dynamic Hedging Strategies
    Speaker: Sanford J. Grossman, John L. Weinberg Professor of Economics, Princeton University

THE CHANGING MARKETPLACE
    Panel Discussion: The Changing Marketplace
    Panelists: Kammal Duggirala, Director of Equity Services, BARA
              R. Steven Wunsch, Vice President, Kidder, Peabody & Company
              James C. French, Senior Vice President, Wellington Management Co.

October 20 –
    Anomalies, Inefficiencies and Active Equity Management: Practical Approaches
    Speaker: George M. Douglas, First Vice President, Director, Quantitative Research, Drexel Burnham Lambert Inc.

Earnings Yields, Market Values and Stock Returns
    Speaker: Donald Keim, Assistant Professor of Finance, Wharton School

Selecting Superior Securities
    Speaker: Marc R. Reinganum, Phillips Professor of Finance, University of Iowa

The Arbitrage Pricing Theory and Market Anomalies
    Speakers: Bruce N. Lehmman, Associate Professor, Columbia University
              David Modest, Professor, Univ. of California, Berkeley

Size and Industry Related Covariations of Stock Returns
    Speakers: Gur Huberman, Professor, Univ. of Chicago
              Shmuel Kandel, Professor, Univ. of Chicago

October 21 –
    A Look at Real Estate Duration
    Speakers: Martin L. Leibowitz, Managing Director
              David J. Hartzell, Vice President
              David G. Shulman, Vice President, Salomon Brothers, Inc.

Commercial Real Estate Returns and Portfolio Allocation Decisions
    Speaker: Michael Miles, Professor, University of North Carolina
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April 11 – INTERNATIONAL INVESTING -- VALUATION & RISK
Valuation Factors Across Countries
Speaker: William E. Jacques, Chief Investment Officer, Martingale Asset Management

Active International Asset Allocation without Forecasting
Speakers: H. Gifford Fong, President, Gifford Fong Associates
Olrich A. Vasicke, Consultant, Gifford Fong Associates

A Global Search for Value: Expected Return as a Function of Price to Book Value and Return on Equity
Speaker: Michael F. Wilcox, C.F.A., Vice President, Morgan Stanley

A Dividend Discount Model Applied to the Japanese Market
Speakers: Yusaku Sakaguchi, Vice President, Quantitative Group, Nomura Investment Management
Yasuchika Asaoka, Vice President, Systems Science Dept., Nomura Research Institute

Do U.S. Asset Allocation Disciplines Work Globally?
Speakers: Robert D. Arnott, Vice President, Salomon Brothers, Inc.
Roy A. Henriksson, Vice President, Salomon Brothers, Inc.

April 12 – RISK ESTIMATION -- ALTERNATIVES TO MEAN VARIANCE MEASURES
Are the Traditional Views Still Valid?
Speaker: Andrew Rudd, President and CEO, BARRA

Noise Traders in Financial Markets
Speakers: Lawrence Summers, Nathaniel Ropes Professor of Political Economy, Harvard University
Andrei Shleifer, University of Chicago

Mean Reversion in Stock Prices: A Behavioral Interpretation
Speaker: Richard Thaler, H. J. Louis Professor of Economics, Johnson Graduate School of Management, Cornell University

Application of Non-Linear Science Statistical Inference Theory to Finance and Economics
Speaker: William Brock, F. P. Ramsey Professor of Economics, University of Wisconsin

April 13 –
The Real Truth About the Interday Relationship Between Program Trading and Stock Index Price Volatility
Speaker: Sanford Grossman, John L. Weinberg Professor of Economics, Princeton University

The Brady Report: Findings and Implications
Speaker: Gilbert Beebower, Executive Vice President, S.E.I., Member of the Professional Staff of the Brady Commission

Debating the Findings
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R. Sheldon Johnson, Managing Director, Morgan Stanley & Co., Inc.
Gilbert Beebower
Jeffrey A. Geller, Senior Vice President, BEA Associates
Sanford Grossman
October 2 –

**Words of Welcome**

Speaker: James J. Leisenring, Vice Chairman, Financial Accounting Standards Board

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October 3 – **PLANNING AND STRUCTURING THE PENSION PLAN**

**The Manager’s Perspective**

Speakers: William L. Fouse, Chairman, Mellon Capital Management Corp.
Frederick L. Muller, President, Atlanta Capital Management

**The Consultant’s Perspective**

Speakers: Wayne H. Wagner, Partner and Chief Investment Officer, Plexus Group
Keith P. Ambachtsheer, Principal, Ambachtsheer & Associates

**The Plan Sponsor’s Perspective**

Speakers: John W. English, The Ford Foundation
Robert E. Shultz, Vice President, RJR Nabisco, Inc.

**Panel Discussion: Planning and Structuring the Pension Plan**

Panelists: William L. Fouse
Keith P. Ambachtsheer
John W. English
Frederick L. Muller
Robert E. Shultz
Wayne H. Wagner

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October 4 – **ASSET ALLOCATION -- MARKET TIMING BY ANOTHER NAME?**

**The Case for Tactical Asset Allocation**

Speakers: Richard A. Crowell, Senior Vice President, The Boston Company
Edgar E. Peters, Vice President, The Boston Company

**The Case Against Tactical Asset Allocation**

Speaker: Kenneth French, Professor, University of Chicago

**Asset Allocation: The Long Term View**

Speakers: Martin Leibowitz
William Krasker, Vice President, Salomon Brothers, Inc.

**Panel Discussion: Tactical Asset Allocation**

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Richard Crowell
Charles DuBois, Vice President, Citicorp Investment Management, Inc.
Kenneth French
William Krasker
William F. Sharpe, President, Sharpe-Tint, Inc.

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October 5 – **RESEARCH PAPERS**

**Problems and Some Solutions for Mean Variance Optimizers**

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Measuring Corporate Bond Mortality and Performance
Speaker: Edward I. Altman, Professor, New York University

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Evolving Technology and Global Investing

April 17 – International Equities
The GDP Case for Portfolio Weightings
Speaker: David A. Umstead, Managing Director, Boston International Advisors, Inc.

The Liquidity Factor in Country Weightings
Speaker: Theodore S. Roman, Director, FT-Actuaries World Indices

Global Factors: Fact or Fiction?
Speaker: Andrew Rudd, President & CEO, BARRA

International Comparisons and Risk Measures – Back to Basics
Speaker: Gordon M. Bagot, Director, Research & Consultancy, The WM Company

Hedged or Unhedged?
The Case for Hedged Globally Diversified Portfolios
Speaker: Vilas Gadkari, Director-Research, Salomon Brothers

Equilibrium Exchange Rate Hedging
Speaker: Fischer Black, Partner, Goldman, Sachs & Co.

Unhedged International Portfolio Strategies
Speaker: Gary L. Bergstrom, President, Acadian Financial Research

April 18 –
Multi-Index Risk Model of the Japanese Stock Market
Speakers: Professor Edwin J. Elton and Professor Martin J. Gruber
New York University

Country Funds: Pros and Cons
Speakers: Laura Luckyn-Malone, Portfolio Manager, Japan Fund and the Scudder New Asia Fund, Scudder Stevens and Clark
Steven Cress, Senior Closed-End Analyst, Prudential-Bache

An Overview of Analytical Elements of Agency Theory
Speaker: Professor Albert S. Kyle, University of California at Berkeley

Estimation Risk and Incentive Contracts for Portfolio Managers
Speakers: Professor Laura T. Starks, University of Texas-Austin and Professor Susan I. Cohen, University of Illinois, Champaign

April 19 –
Negotiated Large Block Trades
Speakers: Professor Michael J. Barclay and Professor Cliford G. Holderness, University of Rochester

Arbitrage Based Estimation of Term Structure of Interest Rates
Speakers: Professor Ehud I. Ronn, University of Texas and Robert R. Bliss Jr., University of Chicago
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Post-Buyout Performance Research: Data, Methods and Models
Speaker: William F. Long, Guest Scholar, The Brookings Institute

Sources of Value in Management Buy-Outs
Speaker: Steven Kaplan, Graduate School of Business, University of
Chicago

Lessons from the RJR Nabisco LBO
Speaker: Richard S. Ruback, Associate Professor of Business Administration,
Harvard Business School

Do Bad Bidders Become Good Targets?
Speaker: Mark Mitchell, Research Scholar, The Securities and Exchange
Commission

October 17 –
The Value of Control
Speaker: Jack Treynor, President, Treynor Capital Management, Inc.

Public vs. Private Values: Implications of the Global Merger Boom
Speaker: Lawrence S. Speidell, Trustee, Batterymach Financial Management

HIGH YIELD BONDS
Leverageability of Corporate Assets
Speakers: Martin L. Leibowitz, Managing Director,
Eric Lindenberg, Director,
Stanley Kogelman, Vice President
Salomon Brothers

Mortality and Performance of Corporate Bonds -- Analyzing the Debate
Speaker: Edward I. Altman, Hax H. Heine Professor of Finance, Stern School
of Business, NYU

October 18 – HIGH YIELD BONDS
Institutional Investor's Perspective of the High-Yield Bond Market
Speaker: Murali Ramaswami, Senior Vice President, The Travelers Investment
Management Company

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Robert Bernstein, Delaware Capital Management
Edward I. D'Alelio, The Putnam Companies
Paul Owens, Berkeley Capital Management
Murali Ramaswami
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The Investment Management Business in the '90s
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March 26 – EQUITY INVESTING
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Paul Samuelson, Senior Vice President, Colonial Equity Management Inc.

New Economic Components of Valuation
Speaker: Roger F. Murray, Columbia Business School, Emeritus

How a Modern Day CIO Looks at the Investment Process
Panelists: Martin L. Leibowitz, Managing Director, Salomon Brothers, Inc.
Leon G. Cooperman, Chairman and CEO, Goldman Sachs Asset Management
John W. English, Vice President, Ford Foundation
John H. Hobbs, President, Jennison Associates

The Effects of Marketability on Equity Value
Speakers: William L. Fouse, Chairman and
Thomas Loeb, President, Mellon Capital Management

Modeling the Risk of Small Cap Stocks
Speaker: Richard Grinold, Director of Research, BARRA

March 27 –
Stock Market Complexity and Investment Opportunity
Speakers: Bruce I. Jacobs, Principal, and
Kenneth N. Levy, Principal, Jacobs Levy Equity Management

The Pricing of Common Stocks
Speaker: Myron Gordon, Professor, Faculty of Management, University of Toronto

Equity Management: Will the Future Resemble the Past?
Speakers: Robert A. Haugen, Director, A.G. Risk Management
William W. Jahnke, Chairman, Vestek Systems

March 28 –
Are Japanese Stock Markets Too High?
Speaker: Kenneth R. French, Professor of Finance, Graduate School of Business, University of Chicago

Changes in Consensus Earnings Estimates and Their Impact on Stock Returns
Speaker: Langdon B. Wheeler, President, Numeric Investors

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A Lawyer's Ruminations on the Use of Theory and Evidence in the Regulatory Process
Speaker: Edward Fleischman, Commissioner, U.S. Securities and Exchange Commission
October 15 – VOLATILITY MODELS
Introduction to the Topic
Speakers: H. Gifford Fong, Chairman, Gifford Fong Associates
          Lawrence Harris, Associate Professor, USC School of Business

Volatility: Statistical Models for Financial Data
Speaker: Robert F. Engle, III, Professor, Chairman, Department of Economics,
         University of California, San Diego

APPLICATIONS TO INTERNATIONAL DATA
International Transmission of Volatility
Speaker: Yasushi Hamao, Assistant Professor, Graduate School of International
        Relations and Pacific Studies, University of California, San Diego

The Volatility of Currency Futures Returns During Trading and Nontrading Hours
Speaker: Peter Kretzmer, Assistant Professor of Finance and Business
         Economics, USC Graduate School of Business

The Equity Term Structure: The Role of Volatility in Pricing Equities
Speaker: Michael Granito, Managing Director, J.P. Morgan Investment
         Management, Inc.

October 16 – VOLATILITY AND POLICY
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Speaker: G. William Schwert, Gleason Professor of Finance, Simon School of
         Business, University of Rochester

Program Trading and Intraday Volatility
Speaker: Lawrence Harris, Associate Professor of Finance and Business
         Economics, USC School of Business

Stock Prices and Volume
Speaker: Peter E. Rossi, Professor, Graduate School of Business, University of
         Chicago

Dividend Yield and Efficient Frontiers
Speakers: John S. Brush, President, Columbine Capital Services, Inc.
          Anthony Spare, Chief Investment Officer, Spare, Tengler, Kaplan
          & Bischel, Inc.

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         Stanford University

The Long Run Performance of Initial Public Offerings
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FRANK RUSSELL COMPANY
GENERAL MOTORS CORPORATION
GIFFORD FONG ASSOCIATES
HARRIS INVESTMENT MANAGEMENT
INTERNATIONAL MONETARY FUND
JACOBS LEVY EQUITY MANAGEMENT, INC.
KIDDER PEABODY & CO., INC. WEBSTER MANAGEMENT
LYNCH, JONES & RYAN
MARTINGALE ASSET MANAGEMENT
McKINSEY & COMPANY, INC.
MELLON EQUITY ASSOCIATES
MILLER, ANDERSON & SHERRERD
J. P. MORGAN INVESTMENT MANAGEMENT, INC.
NEW AMSTERDAM PARTNERS L.P.
NOMURA CAPITAL MANAGEMENT, INC.
OPPENHEIMER CAPITAL
PANAGORA ASSET MANAGEMENT, INC.
PRUDENTIAL INVESTMENT CORPORATION
SALOMON BROTHERS INC.
SEI CORPORATION
STATE STREET BANK & TRUST CO.
THE TRAVELERS INVESTMENT MANAGEMENT CO.
T. ROWE PRICE ASSOCIATES
TSC ASSET MANAGEMENT COMPANY INC.
THE VANGUARD GROUP
WELLINGTON MANAGEMENT COMPANY
WILSHIRE ASSOCIATES INCORPORATED
XEROX CORPORATION
YORK MANAGEMENT & RESEARCH, INC.

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