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THE INSTITUTE FOR QUANTITATIVE RESEARCH IN FINANCE

VOLUME 2

The Institute
of Chartered
Financial Analysts

THE
FINANCIAL
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VOLUME 2

SUMMARY OF Q CONFERENCES
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SUMMARY OF PROCEEDINGS

PREFACE TO VOLUME 2

In December of 1983, The Institute for Quantitative Research in Finance, popularly called The Q Group, published Volume 1 of its Summary of Proceedings, which covered the Institute's semi-annual seminars for the period 1976 through 1982. In this new volume we are publishing summaries covering the three year period 1983 through 1985. Note that the Index provided in this second volume includes the seminar summaries from both volumes. Thus, anyone interested in a particular subject can quickly review all presentations made before The Q Group for the entire period, 1976 through 1985.

For those of you who are unfamiliar with the Institute and its activities, we would like to provide some brief background material. The Institute for Quantitative Research in Finance, is a specialized professional service organization that has as its prime purpose helping its members stay abreast of and helping to advance the state of the art in investment management. The Q Group consists of more than 60 sponsor organizations from a broad range of financial institutions, consulting firms, pension fund sponsors and universities. It conducts seminars twice a year, funds research projects and periodically distributes research papers to its sponsors. The Q Group seminars present research results of practitioners in the field as well as those of academic representatives of leading graduate business schools. In addition, the results of research funded by The Q Group are presented to the seminar audiences.

Since 1976, Dr. J. Peter Williamson, Professor of Business Administration at the Amos Tuck School at Dartmouth College has been preparing summaries of the semi-annual seminars. The summaries provide both a record of the meetings and a simple resume of the main points contained in each presentation.

As the number of seminars grew, it became evident that a compendium of the summaries, organized by subject matter, would be a valuable resource to Institute members. Thus, volume 1 of the summaries was born. Anyone wishing to study a topic, such as Duration or Stock Valuation Models, could survey a significant amount of literature very easily. As the book of summaries progressed, it became apparent that it represented a unique and extraordinary source of information on many of the subjects that serious investment analysts are now studying.

The Institute of Charted Financial Analysts (ICFA) and the Financial Analysts Research Foundation (FARF) recognized that Volume 1 of the Summary of Proceedings, would be valuable to their members. After discussions between The Q Group and the ICFA's Darwin M. Bayston, it was agreed that the ICFA would distribute Volume 1 of Summary of Proceedings to its members. The Institute is pleased that Volume 2 is being distributed to ICFA members in the same manner.

As we did in the first volume, acknowledgement must be given to the many speakers who labored over their presentations to the seminar attendees and to the members of The Q Group Program Committee who chose the subjects and speakers. Acknowledgement must also again be given to The Q Group Board of Directors, especially James L Farrell, Jr., Chairman of The Q Group, and Daniel Rie of Colonial Management Associates, Inc., Chairman of the Administrative Committee, who saw the value of these documents and the benefits of publishing them. Finally, we gratefully express our thanks and appreciation to Dr. J. Peter Williamson for his superb organizational effort in developing a group of diverse and often difficult topics into a meaningful and highly readable text.

We hope researchers and readers of this new text find it to be an invaluable addition to their libraries.

Dale Berman
Secretary-Treasurer
The Institute of Quantitative
Research in Finance
New York, N.Y.
October, 1986

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BONDS–PASS THROUGH SECURITIES

1. MORTGAGE CONVEXITY (Fall, 1984)

This presentation, and the following three, were introduced by Martin L. Leibowitz, Managing Director, Salomon Brothers, Inc., who offered comments on the magnitude of mortgage originations, and the impact on capital markets of the securitization of mortgage obligations. The constant introduction of new instruments, the prepayment uncertainty in mortgage obligations, the sensitivity of prices and cash flows to interest rates and the importance of the volume of new housing are all elements of considerable importance to investors.

Dexter E. Senft, Managing Director, The First Boston Corporation, spoke to the Fall, 1978 Q Group seminar on the subject of prepayment estimation and yield determination on GNMA pass-through securities. At this present seminar he reported on new analysis of prepayment patterns and the relationship between yields and prepayments.

He began with some observations on what is known as "convexity," a desirable feature of an investment. Convexity characterizes an instrument whose value rises if interest rates increase and also if interest rates decline. As one participant observed, the effect is similar to that of holding a "straddle." Senft agreed, commenting that one pays for this benefit presumably through a reduced yield on the instrument. He showed that a mortgage instrument, with level payments, is more convex than a zero-coupon instrument with the same duration. He went on to compare a coupon-paying bond, a zero-coupon bond, and a level-debt-service mortgage, with different durations. Each showed a convex relationship between the value of the instrument and yield, but no one instrument dominated the others, because the durations were not the same. His next example showed that if one adjusted the investment in the three instruments so as to produce the same dollar duration (that is, there would be the same dollar change in value for a change in interest rates), the zero-coupon showed the best convexity, and the level-payment mortgage the worst.

He turned next to prepayments, to explore the impact on the beneficial convexity characteristic of different mortgage prepayment rates. In effect, high prepayments have the effect of shortening the duration of the mortgage instrument. Shortening duration is beneficial as interest rates rise, and unattractive to the investor as interest rates fall. The prepayment rate itself can be expected to change, always to the detriment of the investor. As yields rise, prepayments slow and durations rise. Senft showed a graph demonstrating the relationship between the prepayment rate on all GNMAs and the GNMA price level. The correlation was obvious: as interest rates fall and the price level rises, the prepayment rate also rises. A graph of iso-duration lines showed the combinations of prepayment rate and yield that produce a constant duration for any particular pass-through security. From the iso-duration line for a security one can identify the yield ranges over which a speed-up or a slow-down in prepayments will hurt the price performance of the instrument. The convexity feature will turn to concavity.

Next, Senft introduced a total return measure. Up to this point he had been examining the impact on the price of an instrument of changes in prepayments. But the price of the instrument puts a value on only the remaining payments; it does not attribute value to the prepayments received. The total return evaluation considers both the prepayments received and the price of the remaining payments to be made. Once again, one can construct an iso-duration line and identify where a speed-up or slow-down in prepayments will reduce total return.

The next step was to plot actual yield and prepayment combinations for pass-through securities and to compare this historical experience with the combinations that are predicted to reduce total return. It turns out that a good deal of the time total return suffered, and a good deal of the time it did not.

Repeating the analysis for a range of coupons produced some interesting results. As the coupon approaches the yield, and the instruments are priced close to par, the results approximate those reached when only the price of the instrument is considered, rather than the total return. For bonds with current coupons, historic experience indicated some prepayments reduced total return and some had no effect. But at very high coupons, the historic experience was almost all bad.

Senft closed with a few comments on collateralized mortgage obligations. He had performed the convexity analysis for CMOs backed by low-coupon and high-coupon GNMAs. It turns out that the exposure to prepayment changes is no better or worse, depending on the coupon of the backing instrument, but in general convexity is much less attractive for the CMO than it is for the straight mortgage obligation.

In response to a question, Senft commented that as the holding period increases in the total return analysis, there is less likelihood of the convex relationship turning concave because of prepayment changes. In this respect the attractiveness of the mortgage instrument increases with the holding period.

2. ADJUSTABLE RATE MORTGAGES (Fall, 1984)

Michael Waldman, Vice President and Manager of Mortgage Research, Salomon Brothers, Inc., began by observing that the two most explosive developments in the mortgage market in the last year or so have been collateralized mortgage obligations (CMOs) and adjustable rate mortgages (ARMs). Between two-thirds and four-fifths of new mortgages are ARMs. The chief reason for their popularity appears to be the low initial interest rates offered, the so-called teaser rates. Competition among lenders focuses on these low initial rates. But although ARMs account for a substantial proportion of new mortgages, the secondary market has been slow to develop. While there is in place a full-fledged GNMA-ARM program, no packages have yet been issued. And so far there appear to be great difficulties in introducing ARMs into the capital markets.

Waldman reviewed the problems one faces in developing a satisfactory secondary market for ARMs. First, there is a substantial lack of standardization. FNMA holds over one hundred types of ARMs in its portfolio. Second, many perceive serious credit problems related to ARMs. What is sometimes referred to as "payment shock" may be faced by borrowers as interest rates rise. Devices to reduce the impact of payment shock help to create the third problem: the failure of ARMs to fully adjust to market rates of interest. Finally, it is very difficult to place an appropriate value on ARMs.

Waldman next discussed the variety of terms attached to a particular ARM. It is easy to see the problem of lack of standardization when the rate may be tied to one of several indexes. There are various adjustment periods for the rate payable and the payment; initial rates vary; the margin between the index and the rate on the instrument varies; and there are various periodic and lifetime interest rate caps, as well as payment caps, leading in many cases to negative amortization.

The most popular rate indexes used appear to be cost-of-funds (the Federal Home Loan Bank Board publishes cost-of-funds indexes for thrifts), the one-year Treasury bill rate, the six-month Treasury bill rate, the Federal Home Loan Bank Board average mortgage rate, and the three-year Treasury rate. The cost-of-funds index generally moves rather slowly and lags changes in market rates of interest. This, of course, is painful to the investor. The one-year Treasury rate index will lead to quicker response, but the caps on rate and payment changes make it very difficult to evaluate the instrument.

Waldman demonstrated some scenarios showing the paths of ARM rates corresponding to movements in market rates. The ARM rate movement is constrained both by caps on rate changes and by caps on payment changes. From these paths one can move to examine the interest rates at which the investor will be penalized. That is, if the instrument was originally set up to provide a 200-basis point margin above the cost of funds, one can examine the reduction and ultimate elimination of this margin as a function of interest rate movement. Waldman presented a number of graphs showing the relationship. He went on to show the relationship between the "teaser" rates and the experience of investors at different interest rate levels.

3. GNMA PREPAYMENTS (Fall, 1984)

Helen F. Peters, Vice President-Group Manager, Debt Strategy Group, Merrill Lynch Pierce Fenner & Smith, began with a general discussion of the homeowner's decision to prepay a mortgage. She commented on the very simplistic prepayment assumptions that underlie conventional yield calculations for mortgage pass-through securities. Actual prepayment experience will have a significant effect on the investor's rate of return, so in valuing pass-through securities it is important to make some estimates of prepayments. She commented that the usual economic analysis is not satisfactory. One cannot, for example, use conventional option valuation models, because they assume the homeowner would prepay or not prepay solely on the basis of interest rate movements. Peters pointed out that the homeowner is subject to a variety of costs and constraints that may lead to behavior rather different from that predicted by simple economic models.

In attempting to analyze and understand the behavior of the homeowner as an economic unit holding an option to prepay, Peters had turned to prepayment data collected by GNMA, the Federal Home Loan Mortgage Corporation, and FNMA. She had encountered enormous difficulties with the data. The degree of disaggregation was often unsatisfactory. Data for pools will include a variety of coupons and maturities. Frequently there are simply serious errors in the data. Voluntary prepayments and default prepayments are often not distinguished. Unfortunately, the originators of mortgages do not monitor these mortgages carefully so as to collect data on prepayment experience. Her opinion was that until this monitoring takes place it will be extremely difficult to build from data a clear picture of prepayment experience under different conditions.

Her final observation was that the pass-through market is a very large one, growing much faster than investor understanding of it. While she believes that mortgages do belong in a diversified portfolio, she noted that the low level of understanding suggests that the market is highly inefficient. Investment in pass-throughs may therefore be inappropriate for the passive manager, dangerous for active managers who have not taken the trouble to understand the market, and very profitable for those who do understand it and can take advantage of less able participants.

BONDS–PORTFOLIO MANAGEMENT

4. REFLECTIONS ON THE ENVIRONMENT, VALUATION AND MANAGEMENT OF DEBT SECURITIES (Fall, 1984)

Gary W. Schreyer, Partner, Rosenberg Capital Management, stressed the superiority of active over passive fixed-income management for pension funds. He identified two trends: One toward relatively short duration in actively managed portfolios and another toward longer duration for passively managed portfolios. And he added that actuarial rates for pension funds may have a significant influence on the strategy followed.

In Schreyer's opinion, passive management of fixed-income portfolios is really a subdivision of active management. Passive management involves immunization on a particular duration, a choice that will have a significant impact on the performance of the portfolio. And the choice, he argued, may not be based on an appropriate judgment with respect to market rates of interest. He went further, to suggest that because by its very terms a passive strategy appears not to call for careful monitoring of changes in duration, changes are likely to take place at precisely the wrong times and in the wrong direction.

Turning specifically to actuarial rates, Schreyer observed that they do not represent realistic approximations of interest rates available in the marketplace, yet they may be used by some plan sponsors as a guide to a satisfactory rate for immunization purposes, thereby giving rise to quite a false sense of what is a prudent investment.

A lively discussion followed Schreyer's presentation. There was wide agreement that the actuarial rate for a pension fund is not an estimate of a market rate of interest, and generally should not be used as a guide to a satisfactory passive immunization strategy. This is simply not the purpose of an actuarial rate. Whatever the merits of passive investment, contingent immunization was suggested as a valuable feature of active management, and Schreyer agreed.

BONDS–QUALITY AND RISK

5. PORTFOLIO STRATEGIES IN THE HIGH YIELD DEBT MARKET (Fall, 1985)

A paper by Edward I. Altman and Scott A. Nammacher entitled "Anatomy and Portfolio Strategies of the High Yield Debt Market," was distributed.

Edward I. Altman, Professor of Finance and Chairman of the M.B.A. program at New York University, began his presentation with a description of this market. It consists of about $80 billion in market value of non-investment grade bonds and can be broken into three or four classes. First are those that were originally rated investment grade but that since have fallen in quality. Second are the emerging growth companies that have never been rated investment grade, and third are issues used in connection with takeovers. A possible fourth class would include debt issued by companies turning from private placements to the public market that have not yet established their credit standing.

Altman examined for the high-yield bonds both the default risk and the interest rate risk as a preliminary to evaluating the attractiveness of these bonds as a group. From 1974 through 1984 default rates averaged 1.60 percent. But as defaulted bonds traded on average at 41 percent of par shortly after default, the average reduction in returns due to default would have been approximately 1.0 percent per year (assuming purchase at par). Altman tested the possibility that the loss could have been reduced by screening the issuers of high-yield bonds, using the Zeta credit evaluation methodology that he had first proposed some eight years earlier.

Zeta scores are derived from a discriminant model making use of seven variables: profitability, stability of earnings, debt service capability, cumulative profitability, liquidity, capitalization, and size. The lower the score the greater the similarity between the firm examined and those that have gone bankrupt in the past, and therefore the greater the likelihood that the firm examined is headed for bankruptcy. It turned out that all but two of the thirty defaults over his test period could have been avoided by selling a bond issue when the issuer's Zeta score fell below zero. Altman went further, to discuss the results of a number of investment strategies using high-yield bonds. Portfolios could be made up on the basis of ratings (S&P BB, B, and CCC) or by Zeta score (greater than 1, greater than 1 and rising, greater than 1 and falling, greater than 2.5), or by quartile of Zeta score. Over the test period all these portfolios performed significantly better than both long-term government bonds and corporate investment grade bond portfolios.

There were some surprising and some not so surprising results. A graph of yield to maturity against standard deviation of yields indicated about what one would expect, with long-term governments showing the lowest yield and also the lowest standard deviation, and the high-yield bond portfolios arrayed up toward high-yield and high standard deviation. A graph of average returns against standard deviation of returns, however, showed a sharp increase in return, with little difference in risk, over the A to B rating range. A graph of average monthly returns against standard deviation of monthly returns produced even more surprising results, with long-term governments and A-rated corporate bonds showing relatively high standard deviations and very low average rates of return. Altman commented that the explanation for the poor performance of the long-term governments and the A-rated corporates may lie in duration. It turns out that the high-yield bond portfolios did have somewhat lower durations than the government and investment grade corporates. After adjusting for duration (by constructing synthetic government bond portfolios to match the durations of the high-yield bond portfolios), Altman found that the government bond returns were lower and less volatile than those of the high-yield bond portfolios. And a graph of return against standard deviation produced the sort of array one might expect.

In conclusion, Altman observed that the default rate on high yielding bonds has not been such as to make the overall performance of these bonds unattractive. And credit scoring techniques (including the Zeta score methodology) can eliminate most of the default experience.

6. THE RISK AND RETURN CHARACTERISTICS OF LOWER RATED BONDS (Spring, 1985)

A paper by Donald B. Keim and Professor Marshall E. Blume, entitled "Risk and Return Characteristics of Lower-grade Bonds," was distributed.

This presentation was given by Robert J. Bernstein, Vice President, Delaware Investment Advisors, and Donald B. Keim, Associate Professor of Finance, The Wharton School, University of Pennsylvania. Bernstein described the origin of the research undertaken at The Wharton School on low-grade bonds. Delaware Investment Advisors had begun twenty-five years ago to include low-rated bonds in mutual fund portfolios. They had found the investment record for these bonds impressive, but in view of the popularity of low grade bonds in recent years, they were not sure that the investment superiority had persisted. As a result, they turned to The Wharton School for some careful research. It turns out that over the period 1977 through 1984, low grade bonds were highly profitable, and the demand for these bonds has not reduced the excess returns.

Keim described research that is still in its early stages. The data came from different sources. For the period

December 1981 through May 1984 he had made use of monthly closing prices obtained from Drexel, Burnham, Lambert and from Salomon Brothers. The series was extended to include 1980 and 1981, and June 1984, with the Salomon Brothers high-yield bond index. For the fifty-four-month period, Keim reported for the low-quality bonds a geometric average monthly return of 1.06 percent, an arithmetic mean of 1.14 percent, and a standard deviation of 4.13 percent. As might have been expected, the geometric and arithmetic mean monthly returns on the Salomon Brothers high grade index were somewhat lower, at 0.58 percent and 0.69 percent. But what was surprising was that for the high-grade index the standard deviation was also lower, at 4.73 percent. Keim suggested two reasons for the low standard deviation on the index of lower-quality bonds. Diversification may have a powerful effect, and the generally higher coupons on the lower-quality bonds lead to short durations and hence lower sensitivity to interest rate movement.

For the fifty-four-month period, the performance of the Standard & Poor's 500 Stock Index was very close to that of the low quality bonds. The geometric mean, arithmetic mean, and standard deviation of monthly returns were 1.08 percent, 1.17 percent, and 4.36 percent, respectively. The correlation between the bond returns and stock returns was about the same for the lower quality bonds, at 0.48, as for the high quality bonds, at 0.42. Keim expressed some surprise that the correlation between the high-and low-quality bond returns turned out to be only 0.88. The beta coefficients for the low quality and high quality bond returns, based on the S&P 500 Index, were very similar at 0.46 and 0.44, respectively.

To get a longer-run perspective, Keim used an index constructed by Roger Ibbotson for high-yield bonds, going back to 1926. From 1926 until about 1978, stocks proved to have provided higher returns than low-quality bonds, and low-quality bonds provided higher returns than high-grade bonds. But for the period 1980 through 1984, the excess returns on low-quality bonds were comparable to the excess returns on the S&P 500, and both the low-quality bonds and the stocks achieved much higher returns than did high-grade bonds.

There were some interesting shifts in relative volatilities over the long time period. From 1926 through 1951, low-quality bonds showed a much higher volatility in returns than did high-grade bonds. But from about 1951 through 1984, the high-grade and low-quality bonds showed about the same volatility, considerably below the volatility of common stocks. The same shift showed up for beta coefficients. Before 1951, the beta coefficient for the low quality bonds was much higher than for the high grade bonds. But after 1951, the volatilities were very close.

Keim also reported on the price behavior of defaulting issues around the default date. His data here were the numbers furnished by Drexel and Salomon, for individual issues. A graph of monthly prices from twelve months before default to six months after default indicated a significant price decline throughout over the twelve months before default, showing that prices generally anticipated defaults.

A number of searching questions came from the seminar participants. One had to do with the concentration of ownership of low-quality bonds in savings and loan associations, which one might anticipate could place large blocks of these bonds on the market for quick liquidation. Bernstein agreed that a half-dozen savings and loans own a large proportion of the low-quality bonds outstanding. Such ownership is declining over time, however, and there are more active markets being made all the time. Some years ago, Drexel was the only market maker. Drexel has been joined by Salomon Brothers, Merrill Lynch, Rothschild, Morgan Stanley, Donaldson Lufkin, and First Boston. In answer to a question about the industries represented in the low-quality bond index that Keim had discussed, Bernstein estimated that 25 percent would be bonds of energy companies, 20 percent bonds of utilities, 40 percent industrials, and the remainder from financial institutions.

In commenting on the fact that the volatility of returns for low-grade bonds appears to be not significantly higher than the volatility of returns for high-grade bonds, one participant observed that standard deviation of returns may not be a satisfactory risk measure. The true risk in the lowj quality bonds may lie in the possibility of economic events that will trigger a large number of defaults at more or less the same time.

7. CONSIDERATION FOR INVESTING IN EMERGING CREDIT (Spring, 1983)

A paper entitled "Investment Opportunities in High Yield Bonds" was distributed.

Michael R. Milken, Senior Vice President, Drexel Burnham Lambert, was unable to be present at the seminar, and his place was taken by Larry Post. Just as Evan Schulman had presented a rationale for purchasing stocks of companies in serious financial difficulties, (see presentation No. 56, below) Post began with a rationale for buying low-quality bonds. He argued that the evidence over a great many years indicated that higher rates of return have been achieved on low-quality bonds, without the investor running a corresponding risk. He observed that corporations, like industries, have life cycles and that the highest-quality credits will almost inevitably decline in quality and in price. By systematically purchasing bonds after rather than before the decline in value, an investor can profit.

The most interesting statistics were those for the period since 1977. It is in this recent period that the quantity of low-quality debt has increased substantially, and in this period we have experienced extra-ordinarily high interest rates and two severe recessions. Post identified the group of all the straight debt issues during this period that were originally rated below investment grade. They amounted to at least $10 million at issuance. Nine companies have gone bankrupt, resulting in a principal loss of about $149 million, representing about 0.49 percent per year of the average amount of post-1976 high-yield bonds outstanding. The loss was actually only about 0.31 percent per year after adjustment for principal loss due to changes in interest rates, which was very small compared to the extra returns achieved in the low-quality market. Since 1977, 217 issues of low-quality bonds have achieved a rate of return of 4.09 percent per year better than that for United States government bonds of the same maturity.

Having established the superiority of investing in low-quality bonds, Post next turned to the selection process. Avoiding companies headed for bankruptcy is important. A useful device for controlling risk is the Market-Adjusted Debt Ratio, or MAD ratio. This is the ratio of the market value of the debt of a corporation to the market value of the debt and equity. A ratio of 5 to 30 percent indicates a company that will probably be upgraded, while a ratio of 70 percent to 90 percent identifies a company that is likely to have its bond rating reduced.

In conclusion, Post observed that the objective is to buy low-quality bonds after the credit deterioration has taken place, and in anticipation of a recovery. To do this requires a correct anticipation of whether there is to be recovery or further deterioration. And the MAD monitoring system is a valuable tool for making the prediction.

COMMODITIES

8. THE PERFORMANCE OF COMMODITY FUNDS (Fall, 1985)

Edwin J. Elton and Martin J. Gruber, Professors of Finance at the Graduate School of Business, New York University, distributed a paper by themselves and Joel Rentzler entitled "Professionally Managed Publicly Traded Commodity Funds."

Gruber opened the presentation with a brief description of the characteristics of publicly traded commodity funds. Prior to February 1979 there was one such fund; by 1984 there were eighty-four funds, with over $700 million in net assets. The funds trade in financial instruments and futures on financial instruments, in foreign currencies and forward contracts on foreign currencies, and in commodities and futures on commodities. Funds take both long and short positions, and trading is on the basis of technical systems, especially trend following systems. Management fees are generally much higher than the fees charged by more traditional fixed-income or equity funds.

Elton discussed the performance data. The study made use of monthly total returns for all publicly traded commodity funds from July 1979 through June 1984. Commodity funds were evaluated as an investment alternative to a bond or stock portfolio, and also in terms of whether it makes sense to add a commodity fund to a stock or bond portfolio. In the course of this evaluation, Elton and Gruber considered the use of a commodity fund as an inflation hedge. It turned out that the correlation of the average commodity fund performance with inflation was close to zero, and there was no basis for determining which funds might offer the best correlation. In conclusion then, commodity funds have not offered an inflation hedge. The explanation may lie in the fact that all the funds take both long and short positions.

Turning to a comparison of commodity funds with investment in stocks and bonds, over the five years studied, he reported that the average monthly return (assuming annual holding periods) was 0.46 percent. And the average standard deviation in monthly return was 10.64 percent. A comparison with stock and bond indexes led to these conclusions: Commodity funds were considerably less profitable than common stocks, with a higher standard deviation, and they were about as profitable as bonds, with a much higher standard deviation. So common stocks (and probably bonds) dominated commodity funds.

The test of whether a commodity fund should be added to a portfolio of stocks and bonds lies in the following equation:

$$\frac{\bar{R}_c - R_f}{S_c} > \frac{\bar{R}_p - R_f}{S_p} \times R_{cp} \qquad (1)$$

where:

$\bar{R}_c$ is the expected return of commodity fund c
R_f is the riskless rate
S_c is the standard deviation of the commodity fund c
$\bar{R}_p$ is the expected return of portfolio p
S_p is the standard deviation of portfolio p
R_{cp} is the correlation between commodity fund c and portfolio p

The procedure adopted by Elton and Gruber was to supply to the testing inequality above all the variables except the expected return on the commodity fund c. They then calculated what this expected return would have to be to just cause some of the commodity fund to be added to the stock and bond portfolio. There were actually four tests run. In two of them it was assumed that the portfolio to which commodity funds might be added was 100 percent stocks, using five-year statistics for stocks and twenty-five-year statistics. In two other cases it was assumed that the starting portfolio was invested 63 percent in stocks and 37 percent in bonds, and again statistics were used for a five-year and a twenty-five-year period. (The twenty-five-year statistics came from Ibbotson and Sinquefield for the years 1960 through 1984; the five-year period was July 1979 through June 1984, the only period for which the commodity fund data were available.) For each of the four cases, the rate of return needed to justify inclusion of a commodity fund in a portfolio was about 0.8 percent per month. This was considerably higher than the actual average monthly rate of return for the funds. So the conclusion was that it did not make sense to include a commodity fund in a stock or a stock and bond portfolio.

Gruber pointed out that one might argue the time period chosen for the testing was unfortunate, because July 1984, the month immediately following the test period, was an extraordinarily good one for commodity funds. However, he was able to report that the average return for the commodity funds through February 1985, although it was better than the average reported for the five-year test period, was still not high enough to justify adding a commodity fund to a stock or a stock and bond portfolio.

The tests up to this point had been based on use of an average or a randomly selected commodity fund. Elton and Gruber next reported tests on the possibility of identifying a superior commodity fund. All these tests indicated that historic performance provides no guide to the selection of a commodity fund promising superior performance. The only characteristic of the funds that seemed to be predictable was the standard deviation.

Gruber had commented on the very high fees charged by the commodity funds, and a question was raised whether the performances of the funds before deduction for fees, might not be fairly impressive. This would be an interesting vindication of the value of technical analysis in the commodity market. Gruber indicated some lines of further research that might help add to the explanations of commodity fund performances.

FOREIGN EXCHANGE

9. THE ROLE OF IMMUNIZATION IN CURRENCY HEDGING (Fall, 1984)

Michael R. Granito, Vice President and Director of Research–Capital Markets, J.P. Morgan Investment Management, Inc., presented a paper by himself and Michael Kelley entitled "The Role of Immunization in Foreign Exchange Management."

Granito's presentation concerned the similarity between bond immunization and long-term currency hedging, and he drew some conclusions with respect to foreign exchange hedging through long-term forward contracts and through a rolling series of short-term contracts.

Foreign investors buying United States bond portfolios frequently wish to secure protection against unexpected foreign exchange fluctuations. But it is both difficult and expensive to purchase long-term forward contracts. More specifically, the transaction cost associated with a five-year forward foreign exchange contract is likely to be about 3/8ths of 1 percent. This led Granito to investigate an alternative strategy of rolling short-term futures contracts. The result would be reduced certainty, yet perhaps an accompanying significant reduction in transaction costs.

Granito reviewed briefly the mathematics of interest rate immunization and showed how similar are the mathematics of foreign exchange hedging. In the case of immunization, the key variable is the duration. In the case of hedging foreign exchange, the corresponding key variable is the size of the short position to be taken through a foreign exchange contract. It turns out that the short position should be equal to the present value of the ultimate investment proceeds. To take a specific example, a United States investor purchases a deutschemark obligation that will return one million deutschemarks in T years. The amount of deutschemarks to be sold forward is given by

$$e^{-rt} \times 1\text{mm DM}$$

where r is the United States interest rate. The result of establishing the forward contract hedge is to assure that up to the time of expiration of the contract the proceeds of the investment have been locked in at the initial exchange rate. If the forward contract is for a short term (and in Granito's examples, sixty one-month forward contracts were used to cover a five-year bond maturity), another contract must be put in place. In theory, in our example, the terminal value of the investment at the end of five years would be

$$1\text{mm DM} \times (f_0 + p_0 + p_1 + \ldots + p_{59})$$

where f_0 is the initial spot exchange rate, and p_1 is the one-month forward premium at time 1.

Granito tested this theoretical result, using interest rate and exchange rate data from England, Germany, Japan, and the United States for July 1974 through December 1983. The assumption was that a resident of England, Japan, or Germany had a known dollar exposure in five years. That is, each had made a five-year, fully immunized investment in a foreign currency. The actual realized value of the five-year investment, accompanied by short-term hedges, was compared with the value predicted by the theoretical expression above. The difference between the two was treated as a transaction cost, and expressed as an annualized rate in basis points.

Granito described the results of testing these rolling short-term hedges as quite good. Annualized transaction costs varied from just a few basis points to as high as forty to forty-five basis points. These can be compared with the typical 3/8ths of 1 percent cost of a five-year forward contract, if indeed such a contract can be found.

His conclusion was that the short-term hedging technique is a reasonable alternative to the use of long-term forward contracts. The choice, he argued, is based on a foreign exchange outlook, just as the choice between an immunized portfolio and the rolling over of short-term debt instruments is based on an interest rate outlook.

INTEREST RATES–YIELD CURVE AND TERM STRUCTURE

10. WHY ARE INTEREST RATES SO HIGH? (Spring, 1984)

Zvi Bodie, Associate Professor, and Robert L. McDonald, Assistant Professor, both of the School of Management, Boston University, distributed a paper that had just been published as "Why Haven't Nominal Rates Declined?" in the Financial Analysts Journal, *March/April 1984.*

They discussed the behavior of holding period rates of return on fixed income securities of different maturities, and the apparent relationship between real and nominal returns.

Bodie began by explaining how the theoretical model underlying this research is a form of the well-known Capital Asset Pricing Model. Their formulation of the model takes the form:

$$R_i - R_j = \text{delta (sigma}_{iM} - \text{sigma}_{jM}),$$

where the left side of the equation represents the real risk premium on asset i relative to asset j, delta is the average degree of risk aversion in the market (which may be thought of as the slope of the capital market line), and the sigmas are covariances. On the basis of the research of others, the authors concluded that delta lies in the range 1 to 6.

The authors used the model to explain risk premiums for United States government bonds of various durations in terms of covariance risk. The return on Treasury bills was chosen as the benchmark, so the real risk premium $R_i - R_j$ represented the real return premium for United States government bonds in duration class i over the real return on Treasury bills.

McDonald continued the discussion, stressing that the risk premiums in the model are premiums in holding period returns, and are not expressed in terms of yield to maturity. The market was taken to be all stocks, thirty-day Treasury bills (the benchmark asset), and bonds and bills of duration one year through eight years. Corporate bonds and municipal bonds were included, as well as foreign securities held by United States households. In principle, the market portfolio should represent all claims held by the household sector, but as a practical matter rate of return data are simply not available on many assets.

A monthly series of rates of return for the benchmark thirty-day bills, United States government bonds of durations one year through eight years, and the market portfolio were adjusted by the monthly rate of increase in the Consumer Price Index (excluding shelter) to derive monthly series of real rates of return. The time period covered was 1973 through 1981, split into two periods, 1973-1979 and 1980-1981 to reflect the likely changes brought about by the policy change of the Federal Reserve in October 1979.

Computing a series of covariances presented a special problem. Covariances should be based upon deviations of actual rates of return from expected rates of return. If expected rates of return are constant over the period for which a covariance is calculated, then the use of the historic mean rate of return to represent the expected rate of return will be satisfactory. But if the expected rate is changing, it is not correct to use the historic mean as a measure of the expected rate. The authors computed covariances using historic mean rates of return, but they also computed conditional covariances from computed expected returns. It turned out that the conditional covariance estimates were almost identical to the unconditional covariance estimates, and the patterns of correlation coefficients were similar. Hence the forecasted real risk premiums were similar.

Tables presented by McDonald showed clearly the effect of the Federal Reserve policy change in the Fall of 1979. As between the 1973-1979 period and the 1980-1981 period, the standard deviations for common stocks and for thirty-day Treasury bills changed very little. But the standard deviations for bonds were up quite substantially, with the increase roughly proportional to the duration of the bonds. For bonds of eight-year duration, for example, the standard deviation in the second period was about four times the standard deviation in the first period.

Turning to a table of annual risk premiums, McDonald pointed out the significant increase in risk premiums for the eight bond durations, from the 1973-1979 period to the 1980-1981 period. For the eight-year duration, the risk premium increased by a minimum of 110 basis points and possibly by over 700 basis points, depending on the level of risk aversion. At a moderate delta of 3.5, the increase was 374 basis points. The authors argued that this substantial increase in the real risk premium goes a long way toward explaining an increase in apparent real returns on long bonds.

The rise in real short-term interest rates in the early 1980s, however, cannot be explained by changes in covariances. The risk premium for duration zero bonds actually fell from the first to the second period.

INTERNATIONAL DIVERSIFICATION

11. INTERNATIONAL FIXED INCOME SECURITIES (Fall, 1984)

Jeff Hanna, Director, International Bond Market Research, Salomon Brothers, Inc., presented a number of what he described as peculiar aspects of the international bond market. That is, these were features of the international market that are not found in the domestic market.

He first asked why a United States investor should be interested in non-dollar bonds at all. At the present time, United States interest rates are considerably higher than foreign interest rates. For example, yields on United States government obligations exceed yields on German government obligations by 500 basis points and yields on French government obligations by 100 basis points. The investor in the nondollar obligation takes on a currency risk in addition to credit and interest rate risk. One explanation for the participation by United States investors in foreign obligations may lie in diversification possibilities.

Hanna argued, however, that most studies showing the benefits of international diversification are concerned with equities. For bonds, the diversification benefits are much less obvious. Much of the risk in a bond takes the form of currency risk. In fact, this risk is probably greater than interest rate risk. So while for foreign stocks the currency risk may not be a major portion of the total risk, for bonds it is. And exchange rates between the United States dollar and a variety of foreign currencies will tend to move together, so that the exchange rate risk is not one that is diversified away easily.

Some graphs of the performance of mixed United States and foreign bond portfolios over recent years demonstrated the doubtful nature of diversification benefits. Hanna commented that the case for international diversification in money market investments would be even weaker than the case for bond investments.

Because the diversification argument is a weak one for investors in non-United States bonds, the rationale for this kind of investment must lie in the use of active management to take advantage of opportunities for high returns. The existence of these opportunities is suggested by the fact that over the last seven years there has been a 35 percentage point differential between the best and worst foreign bond markets.

Hanna's second topic was foreign yield curves. He displayed a number of Japanese yield curves suggesting extraordinary relationships between yield and maturity. It turns out that there are very significant coupon effects in the Japanese bond market. For one thing, the Japanese government tends to do its financing through ten-year bonds, so that all the bonds maturing around a particular date are likely to carry very similar coupons. Second, the Japanese practice is generally to evaluate the attractiveness of fixed-income securities on the basis of current income. This means that low-coupon instruments are regarded as unattractive and will carry relatively high yields. The relationship between coupon and yield to maturity is therefore the reverse of what one would expect to find in the United States bond market.

Hanna displayed an analysis of Japanese yield curves isolating the coupon effect. Regression analyses had been developed, and it was possible to plot the "coupon coefficient," or strength of the coupon effect, at different yield levels. On the basis of this analysis, one might use a forecast of interest rate movements to estimate changes in the coupon coefficient and thereby identify opportunities for substantial profit.

Hanna carried the analysis further to explore the relationship between yields in the Japanese bond market and currency exchange rates. As the yen strengthens, foreigners tend to move into the Japanese bond market, and they will buy Samurai bonds before they buy Japanese government bonds, because of a tax advantage. As foreigners move into the market, the effect of coupon differences on yield differences tends to shift from the Japanese pattern to the United States pattern. Hence, if one can make reasonable forecasts of exchange rate movements, one may be able to predict changes in spreads between Samurai bonds and Japanese government bonds, as well as changes in the coupon/yield relationship, and once again spot opportunities for profit.

Hanna's third topic concerned zero-coupon bonds. He presented yield curves for CATS (United States government discount instruments) and General Electric zero-coupon Eurobonds. Not only were the yields on the CATS higher than the yields on the G.E. bonds, at the same duration, but the shapes of the curves were quite different. Hanna's explanation for this peculiar relationship was that Japanese investors cannot buy CATS but they can buy G.E. zero-coupon bonds. Further, Japanese analysis normally focuses on the simple yield rather than the compound yield to maturity. The simple yield on the General Electric zero-coupon issues is 600 to 800 basis points higher than the yield to maturity for the four issues examined. At present Japanese investors dominate the trading in the G.E. zero-coupon bonds, which appears to account for their extraordinarily low yield to maturity.

Hanna's fourth topic was credit spreads in the international bond markets. World Bank bonds, issued in a variety of currencies, all carrying the same credit risk, form a useful reference point against which to judge other bonds. Graphs of spreads between European Investment Bank bonds and World Bank bonds and Swedish bonds and World Bank bonds illustrated opportunities for profiting by spread forecasting.

There was a discussion of arbitrage possibilities in the zero-coupon market, and the attractiveness of issuing zero-coupon corporates and buying CATS. Hanna commented that he had discussed this possibility but found little enthusiasm on the part of corporate treasurers. He closed with the comment that it is possible to hedge the foreign exchange risk in foreign bonds, and that elimination of this risk may make the international bond market more attractive to United States investors.

12. GLOBAL PENSION ASSETS – THE NEXT TEN YEARS
(Spring, 1984)

Christopher A. Nowakowski, President of InterSec Research Corporation, identified four critical trends for global pension assets in the next decade. First is rapid growth. Pension assets worldwide can be expected to quadruple in the next ten years. And the fastest growth will take place outside the United States. What is particularly interesting is that while the expected increase in domestic pension assets is about equal to the present stock market capitalization in the United States, the increase in pension assets outside the United States will represent about 150 percent of non-United States stock market capitalization.

The second trend is the common evolution of pension services, as a service industry develops in a number of countries similar to what is now found in the United States, Canada, and the United Kingdom. Third is leadership by multinational corporations. Corporate headquarters will take increasing control of pension funds within these organizations, which will influence the development of pension services throughout the world. Finally, the fourth trend is a surge in international investment, with nondomestic pension investments expected to increase tenfold by 1992.

Elaborating on these trends, Nowakowski first discussed the growth prospects. At present, only in the United States and the United Kingdom do pension assets exceed $100 billion. But by 1987, the Netherlands, then Japan, then Switzerland, and then Canada will join this group. Among the causes of growth are an increase in the work force and in real wages, the aging of the work force, broader eligibility for pension benefits and greater benefits, contraction of Social Security benefits, and a shift toward funded plans.

Nowakowski expanded on the common evolution of pension industries in major countries to argue that the trend will generally be in the direction of more aggressive investing. This need not involve higher risk portfolios, but does mean the use of more asset categories, and more active asset allocation. Other countries are likely to show the pattern of management evolution that has emerged in the United States: banks and insurance companies predominate initially in pension fund management; next these managers spin off specialized subsidiaries; independent managers take on pension funds; then large financial service organizations with a broad product line enter; and finally a specialized group of independent managers evolves. It appears that the costs of entering the business of providing financial services to pension funds are very low, and competition is still quite limited.

In discussing leadership by multinationals, his third trend, Nowakowski observed that the headquarters of multinational corporations are becoming increasingly aware of the advantages of centralized administration and global asset management and custody. For those engaged in the provision of financial services to pension funds, the message is that marketing will have to be directed more to headquarters and less to local operations. And the services will have to be aimed at global investment.

International investment, Nowakowski said, has finally reached the stage where plan sponsors are convinced of its advantages. It has been helped by a lowering of governmental barriers, by a global search for real rates of return, and by the discovery of economies of scale in the provision of financial services.

Nondomestic exposure of private pension assets is still quite low worldwide, with about $43 billion of $1,175 billion in assets invested outside the home market. Nowakowski believes that the nondomestic component will reach $500 billion by 1992. The attractiveness of international diversification rests essentially on the performance record, which shows improved returns and reduced volatility.

In closing, Nowakowski's advice to those offering pension fund financial services is to develop a global strategic plan. He said there are not more than 200 money managers able to manage pension-size assets globally, and most of these firms are located outside the United States. Half the foreign investments of United States pension funds are managed by foreign managers. These managers, if they are successful in foreign markets, are likely to become competitors in the management of United States pension assets. His final word was "go global, or go bankrupt."

13. THE WORLD MARKET (Spring 1984)

Gary P. Brinson, President of First Chicago Investment Advisors, stressed the importance of applying portfolio management to a worldwide array of assets, rather than focusing attention separately on domestic asset classes and foreign asset classes. In making up a portfolio from all assets available for investment, the objective is to maximize a function representing the attractiveness of rate of return and the unattractiveness of risk. One would expect assets to be priced so that expected return is a function of perceived risk. But there are two possibilities for this pricing process. Assets in a particular market may be priced on the basis of risks perceived in that market alone. Or they may be priced on the basis of risks perceived in the entire market for risky assets. In the second case, one cannot expect to achieve abnormal returns by investing in a wide variety of markets. But in the former case, one can. First Chicago research suggests that it is the former process that prevails, and abnormal returns are still available.

Brinson described the asset classes that have been studied by First Chicago. He discussed the components of aggregate world wealth, and the components of investable capital markets worldwide. As of the end of 1982, the total value of these markets was $8 trillion, and the components were United States fixed-income 21.1 percent, international dollar fixed income 2.2 percent, international fixed-income 27.4 percent, real estate 10.9 percent, cash equivalents 7.1 percent, large capitalization United States equities 12.3 percent, small capitalization United States equities 5.8 percent, international equities 13.1 percent, and venture capital 0.1 percent. Over the past fourteen years, the non-United States components have grown somewhat faster than the domestic component.

Brinson turned next to some performance characteristics, showing arithmetic and geometric average returns, and standard deviations for each of the asset classes. He also showed a correlation matrix for equity classes and for fixed-income classes. The correlations among equity classes have remained fairly stable through time, while the correlations among fixed-income classes have shown wide fluctuations. The use of non-United States equities over the fourteen years would have reduced risk substantially and also improved returns. The use of foreign fixed-income securities in addition to United States fixed-income securities would have substantially reduced risk but would not have improved rates of return.

Brinson next turned to a multiple markets index, made up of United States large capitalization and small capitalization equities, international equities, venture capital, United States fixed-income, international dollar fixed-income, international nondollar fixed-income, and real estate. The proportions were chosen to produce a risk level roughly comparable to what one would have experienced with a mix of 60 percent United States stocks and 40 percent United States bonds. Comparisons of the performance record of this multiple-markets index against Becker statistics indicated that the index did very well over the period 1970 through 1983. Finally, a comparison of the multi-asset portfolio fund actually managed by First Chicago, for 1982 through the first quarter of 1984, showed that this fund had outperformed the multiple-markets index.

A question was asked about the use of venture capital investments. The multiple-markets index includes 5 percent venture capital, and the same is true for the $150 million multi-asset portfolio. This represents a somewhat higher commitment to venture capital than one would expect to find in most pension funds. Brinson indicated that First Chicago expects a return of about 22.5 percent per year at a 6 percent inflation rate on venture capital, with a standard deviation of 30 percent to 35 percent.

In answer to a question on where the added value of the multi-asset portfolio came from, Brinson answered about half was due to asset allocation and half to security selection.

14. EVALUATING ACTIVE INTERNATIONAL MANAGEMENT THE EARLY RESULTS (Spring, 1984)

Jan Twardowski and Donal Botkin, Senior Vice Presidents of Frank Russell International, emphasized as had Gary Brinson (in presentation No. 13 above) the value of worldwide portfolio management. Twardowski commented that any analyst following a United States industry that is part of an international industry must follow the major foreign corporations in that industry, and can anticipate in a few years following essentially an international industry.

Worldwide investing began in the 1970s, and when Twardowski spoke to the Q Group Seminar five years earlier, he had been discussing largely a theory of international investment, without much actual data. The data have begun to accumulate, and he described Frank Russell's 1981-1983 data base as being a useful one from which to draw conclusions. International portfolio investment has had a positive effect on equity portfolios, despite a strong United States dollar. Active management added value, and the particular sources of extra return varied among different management approaches.

For ten United States pension plans monitored by Frank Russell and representing about $9 billion, Twardowski showed that for the three years 1981 through 1983 international portfolio diversification had significantly reduced risk, without having any noticeable effect on rate of return. In 1981 and in 1983 risk had been reduced and return increased, but in 1982 both risk and return had been reduced.

Next, Donal Botkin discussed how active management had countered the negative effect of a strong dollar. The Russell methodology separates contribution to total return into four components: currency, country selection, stock selection, and cash/bond allocation. The last of these might be designated timing. For individual managers, Botkin showed results for three years through 1983 and for the individual years. Taken as a group, the managers did well with respect to the currency component in 1981; they profited most from timing and to some extent from currency in 1982; and they did best with stock selection in 1983.

Botkin went on to describe an activity profile developed by Frank Russell to help identify the performance characteristics of a manager. The profile focuses on country allocation, nonequity allocation, and equity concentration. It distinguishes between weighting and activity. Weighting has to do with deviation from the weights in the EAFE index of capital international. Activity has to do with the manager's alteration of weightings. From a graphical presentation of the activity profile, one can quickly see how a manager deviated from the EAFE weightings and how active the manager was in changing weightings. A sequential activity profile can show how a manager's attention shifted among country allocation, nonequity allocation (or timing), and equity concentration (or stock selection).

A somewhat different profile can be compiled by combining the weighting and activity, both of which apply to country and nonequity allocation, to form two factors, and treating selection as a third factor. One can then trace weighting, activity, and selection across time.

Botkin concluded with a discussion of cluster analysis, to make use of the activity profile data in an effort to classify managers in a manner that might be helpful to clients. The cluster analysis was performed on four factors: activity, selection, fixed-income weighting, and country weighting. Botkin showed the results of an analysis clustering some two hundred firms into seven groups. The second group was characterized, for example, by high fixed-income activity, low country weighting, and low selection. These characteristics in general seem to represent a defensive manager. The sixth group, on the other hand, was characterized by high selection, representing a willingness to concentrate the portfolio in a few selected stocks.

In response to a question, Twardowski commented that firms managing international portfolios have tended to move toward an emphasis on stock selection. This can be seen as the result of increased experience with foreign securities, and also in part as the result of more United States firms, with a penchant for stock selection, entering international management.

15. CHANGES IN THE EXPOSURE OF SECURITIES AND PORTFOLIOS TO CURRENCY RISK: A NEW MEASUREMENT APPROACH

(Spring, 1984)

F. Michael Adler, Professor of International Finance at the Graduate School of Business, Columbia University, distributed a paper entitled "Exposure to Currency Risk: Definition and Measurement."

Adler introduced his topic as something quite different from the accounting view of foreign currency exposure. While the accounting measurements are entirely concerned with the translation of foreign currency accounts into United States dollars, Adler's concern was with the future economic impact on a business enterprise of changes in foreign exchange rates. That impact might be felt to some extent by way of actual conversions of values from one currency to another, but it might also be felt in terms of the impact that changes in exchange rates has on revenues and on costs.

He provided a financial definition of exposure in statistical terms. It is the coefficient of the exchange rate in a linear regression of the future dollar value of an asset or a portfolio on the future exchange rate. It can also be a set of coefficients of a number of exchange rates in a multiple linear regression. The point is that currency exchange risk exposure is the portion of the future variation in the dollar price of the asset or the portfolio that is linearly related to the random variations in the exchange rate. In addition to being a regression coefficient, the exposure is a measure of the forward contract one would have to purchase to fully hedge the value of the asset or portfolio.

He stressed that the currency exchange risk is only one of many environmental risks that will affect the future dollar value of an asset or a portfolio. It happens to be one that can be hedged, because forward contracts are available. Even so, only in a few special cases can the currency risk exposure be perfectly hedged. A regression coefficient is not a precise accounting quantity. The future value of the asset to be hedged, in any currency, may not be certain. And there will be a separate measure of exposure for each target date. In special cases, a foreign currency deposit with a known maturity, for example, both the target date and the future value are certain, the asset is 100 percent exposed, and one can establish a perfect hedge.

Adler's paper had set out his methodology, and he did not repeat that discussion. In his presentation before the Q Group, he described some empirical testing. He began with long-term bonds in the markets of Germany, Belgium, Canada, France, Japan, the Netherlands, the United Kingdom, Switzerland, and the United States. As already indicated, the exposure of a short-term nominal foreign currency asset with the maturity equal to the target date is 100 percent. Perhaps surprisingly, Adler discovered that for long-term bonds the exposure was also very close to 100 percent. That is, for a United States investor in German long-term bonds, the regression coefficient on the United States dollar/German deutschemark exchange rate was approximately 100 percent. And the regression coefficients for the same German bonds on the United States dollar/Belgium exchange rate, the United States dollar/Canadian dollar exchange rate, and so on, were essentially zero. The regressions were run on monthly data for the period 1973 through 1980.

Adler next turned to exposures of stock indexes for the same nine countries. For these tests, the time period was divided into a first period preceding November 1979, and a second period following October 1979. The division point was the announcement by Federal Reserve Chairman Volcker on October 6, 1979, of the change from interest rate management to money supply management. For the first period, the exposures for the stock indexes were very similar to the exposures for long-term bonds. Exposure to the currency of the country of the index was not significantly different from 100 percent (with two exceptions: France and Italy), and exposures to other currencies were typically zero.

For the second period, the exposure of the stock indexes in Japan, Canada, and France to their own respective currencies rose significantly above 100 percent. This is an important finding that has some interesting implications for the value of currency hedging. A second important finding, for both the first and second periods, was that the United States stock index showed little exposure to any exchange rate risk. For the first period there was some exposure to the Canadian dollar, and for the second period there was some exposure to the European "snake." But in neither period was there any exposure to the yen. This result seemed surprising, in view of the sensitivity of so much United States industry to imports from Japan.

Adler expanded on the implication of a currency risk exposure in excess of 100 percent. In these cases, the stock index tends to perform well in local currency when the dollar in terms of that currency is weak, and to perform poorly in local currency when the dollar is strong. The result is that by hedging the currency risk, one not only removes uncertainty due to random currency fluctuation, one also reduces some of the variation in value expressed in the local currency. In other words, more than just the currency risk is hedged. There appears in these cases to be greater reason for hedging an investment in foreign stocks than for hedging an investment in foreign bonds, where the exposure never seems to exceed 100 percent. This extraordinary hedging opportunity for foreign stocks, however, will exist only as long as fluctuations in performance in local currency are correlated with fluctuations in the exchange rate. Adler could hold out no expectation that these correlations are stable over time.

Pointing out that exposure can be measured in relation to any environmental variable (not just currency exchange rates) on which a forward or option contract can be written, Adler suggested that as global portfolio management expands there will be a demand for more futures and options contracts on such things as world stock market indices, country stock indices, foreign treasury bills, and foreign interest rates.

There was considerable discussion of the possible reasons why United States stocks do not seem to have been exposed to currency risks. Adler suggested that his findings were counterintuitive, but may simply be the result of too much random variation in index values, obscuring the effect of exchange rate changes.

16. DETERMINING COUNTRY ASSET ALLOCATION (Spring, 1984)

David A. Umstead, Vice President of Putnam International Advisers, distributed a paper entitled "The Country Allocation Decision: Can A Disciplined Risk Control Process Add Value?"

Umstead described the procedure used at Putnam for forming portfolios of foreign stocks and reported on the ability of the process to control variability and enhance rate of return.

The country allocation process involves four steps. Step one requires purely judgmental estimates of the twelve-month expected rates of return in each of ten foreign markets, and United States short-term investments. In step two, these forecasts are scaled back by a 40 percent information coefficient. In the process, all the expected rates of return for foreign stock markets are moved closer to the rate for short-term investment in the United States. In the third step, another set of rate of return forecasts is derived, this time using a model that works from the variability of returns in the different foreign markets. In step four, the two sets of estimated rates of return are combined, and adjusted for past downward bias in return estimation. The forecasts from step four are supplied to an optimizing model, which generates a series of efficient portfolios. Finally, in step five, the expected performances of the efficient portfolios are calculated on the basis of the original unscaled estimated rates of return. The variability measures necessary to step three and to the optimizing process generally are obtained from historic performances. Transaction costs are also allowed for, to reflect the cost of deviating from a "normal" portfolio, representing a passive bogey that is usually a capitalization-weighted portfolio of the allowable investment market.

Umstead showed sample output from the process. The country weightings for each of a series of efficient portfolios, for the currently held portfolio, and for the "normal" portfolio were shown. And for each portfolio the expected return, the standard deviation, the expected growth, and the downside and upside potential were tabulated. He explained that the portfolio managers at Putnam were seldom satisfied with any one of the efficient portfolios, and added a "proposed" portfolio, reflecting the combined judgment of the managers after they had reviewed the data for the efficient portfolios, the current portfolio, and the "normal" portfolio.

There was considerable discussion of the reason for choosing a portfolio that was not one of the efficient portfolios. Umstead commented that it was difficult to pinpoint the basis on which the portfolio managers preferred this portfolio to one of the efficient portfolios. The implication was that having gone through the selection process they had doubts about some of the estimates that had been supplied to the optimizer.

Umstead turned next to the question of control of variability. A plot of the cumulative monthly returns from three portfolios selected quarterly to be approximately 200 basis points apart in variability (on an ex ante basis), showed that the delivered variability differences were almost exactly as predicted. The return enhancement capability of the optimization process was more difficult to test. It appeared that an optimized portfolio outperformed the proposed portfolio by a significant margin and outperformed the "normal" portfolio by a wide margin. The optimized portfolio also achieved a superior variability record. An efficient portfolio based on the scaled committee return estimates alone (omitting step three) offered the same volatility reduction as the regular efficient portfolio, but not nearly as much return improvement over the "normal" portfolio. Step three therefore appeared to make an important contribution.

Tests of the covariances of the equity returns in the various national markets indicated substantial stability in variability, but rather less stability in the correlations. A sensitivity test on correlations, however, indicated that the optimization results are not very sensitive to correlations and therefore the lack of stability in the correlations does not seem to present a serious difficulty.

Summarizing, Umstead observed that Putnam had achieved great success in controlling the variability in internationally diversified stock portfolios. Returns have been slightly better, with considerably less risk, than would have been achieved by portfolios arrived at by a more direct judgmental process. This he considered to be a justification for the quantitative procedures Putnam has been following. The next step will be to extend the modeling to the level of individual securities, to improve the stock selection process as well as country allocation decisions.

MARKET TIMING

17. FORECAST RISK ANALYSIS: A TIMING ENHANCEMENT FOR VALUATION MODELS (Fall, 1985)

George M. Douglas, CFA, Director of Quantitative Research, Drexel Burnham Lambert, Inc., distributed a Drexel quantitative research publication entitled "Forecast Risk Analysis: A Timing Device for Valuation Models."

Douglas began his presentation by observing that Drexel makes extensive use of the dividend discount model. The model, however, presents a timing difficulty in that the "buy" message may come too early or too late. After exploring price momentum and earnings momentum models as a timing correction to the dividend discount model, Douglas reported little success. But Drexel has had success with a model for predicting shifts in consensus estimates.

Work by Robert Arnott has found a correlation between changes in the consensus estimate of earnings and stock prices. So if one could accurately forecast changes in the consensus estimates, one could predict price changes.

The model makes use of six variables. Three of these record changes in the IBES mean forecast: the change in the most recent month, the change in the prior month, and the change two months ago. These variables are weighted 30 percent, 22 percent, and 20 percent. The other three variables have to do with earnings surprise. The surprise in the most recent month is weighted 20 percent, that in the prior month is weighted 7 percent, and the surprise two months ago is weighted 2 percent. The multiple correlation coefficient reported for the model ranges from 0.4 to 0.55. This is somewhat better than the correlation of 0.30 reported by Robert Arnott for his model, and is probably explained by the inclusion of the earnings surprise variables in the Drexel model.

Turning to tests of the value of the model, Douglas presented rate of return results for twelve- and sixteen-month periods ending August 30, 1985. Sorting stocks using the forecast risk model and dividing them into quintiles had proved quite successful. For the twelve-month period, the performances for the quintiles ranged from 27.6 percent for the first quintile to 12.8 percent for the fifth quintile. The average for all five quintiles was 19.1 percent. For the sixteen-month period, the range was from 36.4 percent for the first quintile down to 11.4 percent for the fifth quintile, with an overall average of 24.5 percent. Excluding the earnings surprise variables reduced the success of the model, although it still proved useful.

Digging deeper into what drives the model, Douglas showed evidence of substantial differences in ranking across sectors of the S&P 500, as well as within sectors. He went on to show the data for some individual companies, relating stock price movement over the last three years with the change in the predicted forecast risk factor. It appeared that the forecast risk factor could have been used to predict price movement, although timing would not have been perfect. In some cases it appears that the true consensus (as opposed to the IBES consensus) of the market may begin to shift before the model predicts a change.

In conclusion, the test results supported the proposition that changes in the consensus estimate can be forecasted, and that the forecast can generate value. The model will be useful primarily for industry and sector rotation. The model is least effective at major turning points in the market, which Douglas believes is the result of a shift of market interest away from short-term earnings forecasts to macroeconomic developments.

18. A STRUCTURED FRAMEWORK FOR ASSET ALLOCATION (Spring, 1984)

Robert D. Arnott, Executive Vice President of Trust Services of America, distributed reprints of his article, "Systematic Asset Allocation," from the November/December 1983 issue of the Financial Analysts Journal.

Arnott described a method for tactical asset allocation, taking advantage of the inefficiencies he perceives among the prices for major asset classes. Three assumptions underlie the allocation methodology. The first is that expected rates of return for asset classes are readily and directly calculable. While cash returns are readily available and bond yields to maturity are clearly calculable, there is a question about how one obtains expected returns on equities. Arnott had chosen the dividend discount equity return model. He argued that the use of consensus estimates for dividend yields and growth should give a marketplace return expectation measure.

The second assumption is that the returns used for the model reflect the perceptions of all market participants regarding the relative attractiveness of the asset classes. And the third assumption is that the calculated returns do provide an indication of future relative returns. Once again, in the case of equities these assumptions may be questionable, but Arnott provided justification for both.

Arnott described three stages of methodology, involving somewhat increased complexity and improved performance. The first stage simply made use of the monthly equity excess return and the bond excess return as a guide to the reallocation among asset classes. The equity excess return is the expected equity return less the expected bond return, and the bond excess return is the expected bond return less the expected cash return. Using month-end data from January 1, 1973, through December 31, 1982, Arnott had tabulated the correlation between the two measures of excess return and the subsequent one-month and one-year performances of equities relative to bonds, equities relative to cash, and bonds relative to cash. It seemed clear that the equity excess return was significantly related to the subsequent performance of equities relative to bonds and of equities relative to cash. It was not significantly related to the subsequent performance of bonds relative to cash, a not surprising result. The bond excess return was significantly correlated with the subsequent performances of equities relative to cash and of bonds relative to cash, but not to the subsequent performance of equities relative to bonds. Further tables demonstrated that the application of this stage one methodology would have produced over the ten years superior portfolio returns, compared to the performances of the Becker Universe.

Stage two advanced the methodology from the comparison of expected returns on different classes, to a comparison of trends in relative expected returns. The equity excess return trend was the stage one equity excess return less its twenty-four month moving average. And the excess bond return trend was the stage one bond excess return less its twenty-four month moving average. In addition, a third factor was introduced: the real expected return on cash less its twenty-four month moving average. The state two methodology produced stronger relationships between the excess return trend measures and the subsequent superiority of equities over bonds, equities over cash, and bonds over cash. Arnott referred to the surprising conclusion that trends in real interest rates are much more significant for equity performance than for bond performance. There was a strong negative correlation between the real return trend and the superiority of equity over bond returns and equity over cash returns. In other words, real interest rates well above the two-year average predict a relatively poorly performing equity market.

Stage three switched from expected excess return measures to a number of economic measures including the twelve-month percentage change in the Department of Commerce leading indicators and some measures proprietary to the Boston Company. In most cases, the stage three methodology added value to the stage two methodology as stage two added value to stage one.

Arnott concluded with some comments about the practical applications of the three stages of the asset allocation strategy. One would start with a normal or benchmark allocation, presumably based upon long-run policy considerations. Arnott had used as a "normal" allocation 60 percent in equities, 30 percent in bonds, and 10 percent in cash. If, on the basis of regression analysis, the excess return measures predict a one hundred basis point extraordinary superiority for equities over bonds, one would make a 5 percent shift to a 65 percent-25 percent-10 percent allocation. This shift ratio could be moved up or down, depending upon the level of aggressiveness the client desires. The end result is a portfolio that will move away from its normal allocation modestly or aggressively, as the client wishes, in a systematic way to take advantage of market inefficiencies.

Arnott reported that relatively infrequent reallocations can lead to substantial performance improvement. In answer to a question, he said that the results he had presented did not allow for transactions costs, but he added that the stage three methodology in his test had led to about 30 percent annual turnover, and estimated that transactions costs probably did not amount to more than one hundred basis point annually, leaving plenty of performance superiority over the benchmark portfolio.

OPTIONS AND FUTURES

19. THE DURATION OF OPTION PORTFOLIOS (Fall, 1984)

Mark B. Garman, Professor of Finance and Associate Dean of Academic Affairs, Graduate School of Business, University of California at Berkeley, distributed a paper entitled "The Duration of Option Portfolios."

Garman began his discussion with a brief review of what duration is, in the context of fixed-income instruments. The value of the duration concept lies in its ability to explain the sensitivity to interest rate changes of the value of a fixed-income instrument. But the duration concept can be extended to a variety of instruments, including options and portfolios of options.

While it may be possible to calculate the duration for option portfolios, the question remains whether this duration will explain interest rate sensitivity, as it does in the case of fixed-income instruments. The answer is that it does so under certain circumstances. Garman provided as a first example the case of a forward contract. When the duration is calcuulated as a weighted average maturity, and is compared with the derivative of value to interest rate, it turns out that duration does equal interest rate sensitivity.

In a second example, Garman used the Black-Scholes option pricing formula to show again that the duration is equal to the interest rate sensitivity. But in this case it was necessary to take a partial derivative of value with respect to interest rate, holding constant all other elements in the pricing formula, including forward price. Garman pointed out that the covered interest arbitrage equation, which equates the spot rate for a commodity to the present value of the forward rate presents us with both a spot rate and a forward rate that may change with interest rate changes. Our assumption has been that the forward rate does not change, and the spot rate reflects the full effect of a change in interest rates.

Turning next to an option immunization example, Garman posed the problem of both hedging and immunizing an option portfolio. The hedging was achieved by establishing an option position with an appropriate hedge ratio, so as to bring the hedge ratio for the entire portfolio to zero. Similarly, the new position taken must have a maturity that brings the duration of the entire portfolio to zero. The result is a combination of hedging and immunization.

Garman next demonstrated the replication of an option by combinations of other instruments. The first method was to make use of bonds and current forward contracts. As the forward contracts are current, they have a zero present value, and the entire investment is in the bond component of the replication strategy. Hence one sets the duration of the bond component equal to the duration of the option. A second method of replication makes use of previously written forward contracts. The previously written forward contract will have an investment value, but one can decompose the forward contract into a current forward contract plus a bond position. Replication, then, involves choosing a bond position that together with the implied bond position in the previously written forward contract gives a duration equal to the option duration.

A third method of replication makes use of a dynamically adjusted combination of bonds and a spot instrument. So long as the spot price is assumed to be insensitive to interest rate changes, then one simply chooses a bond component with a duration equal to the option duration. It is important then in immunizing an option position to consider the sensitivity of spot prices and forward prices to changes in the interest rate.

20. A SYNTHETIC OPTIONS FRAMEWORK FOR ASSET ALLOCATION (Spring, 1984)

James A. Tilley, Vice President of Morgan Stanley and Company, distributed a paper entitled "A Synthetic Option Framework for Asset Allocation."

Tilley described an asset allocation technique that simulates the use of multiple asset call options and that can deliver the kind of distribution of expected returns associated with the use of options.

He began by observing that most discussions of risk limitation through the use of options consider put options coupled with an existing portfolio of risky assets. The return outcomes of this combination, however, can be duplicated by investment in a riskless asset and the use of call options. The latter formulation was the one Tilley used, because it leads more naturally to an asset allocation approach.

When a portfolio consisting of a riskless asset and a risky asset is replaced by one consisting of a riskless asset and a call option, the result may be a combination that is not efficient in the mean variance sense, but one that better suits an investor who is concerned with higher moments than variance. More specifically, it can deliver a distribution of returns that is truncated and guarantees a minimum rate of return. This skewness may be more important than variance to a particular investor.

Following the familar Black-Scholes formula for the evaluation of a call option, Tilley pointed out how this formula can be used to establish a portfolio consisting of a risky asset and a riskless asset that will replicate the performance of the riskless asset and call option combination. The allocations to riskless and risky assets will have to be adjusted continuously as the price of the risky asset changes and as time passes. This strategy, one that makes use of the rebalancing of a risky and a riskless asset to duplicate the results of holding a riskless asset and a call option, Tilley referred to as a "synthetic option" strategy.

The more interesting case involved a multiple risky asset situation. Here a special kind of call option is needed. The investor would like a call option that gives the holder the right to purchase on the expiration date, at a specified price, one "share" of the risky asset that has performed best. This will mean that the investor will experience the benefits of having held the single best-performing of all the risky assets available. Tilley demonstrated the pricing formula for this hypothetical call option. And as in the case of the single risky asset situation, he pointed out how one can derive from the pricing formula the appropriate allocation weights for each of the riskless and risky assets, in order to replicate the rate of return characteristics of a combination of the riskless asset and this special kind of call option. Once again, the allocations must be adjusted constantly as time passes and the prices of the risky assets change.

Turning to practical application of the synthetic option methodology, Tilley discussed a model that makes use of estimated expected rates of return and a covariance matrix of returns for the risky assets to be used, with the imposition of constraints if the investor wishes to limit the use of any particular asset. The portfolio objectives are to establish a minimum holding period return (which could be zero) and to achieve as much participation as possible in the upside performance of the best-performing risky assets.

Finally, he presented the results of historical simulation for the period 1973-1983. He had used two risky assets, constant maturity twenty-year United States Treasuries, and the S&P 500 index. His riskless asset was one-year Treasury bills (the time horizon was one year). In presenting his results he showed that in five of ten years the strategy produced the minimum rate of return. In the other years, it delivered between 61 percent and 95 percent of the performance of the better of bonds and stocks. Tilley commented that the performance record would have ranked in the first quartile of the Becker Universe in six of ten years, in the second quartile in two of ten years, and in the fourth quartile in two of ten years.

OPTIONS AND FUTURES–PORTFOLIO INSURANCE

21. COMPARATIVE RETURNS FROM PORTFOLIO INSURANCE: COMPOUND AND MULTIPLE INVESTMENT OPTIONS (Fall, 1985)

John O'Brien, President, and Robert Ferguson, Senior Vice President of Leland, O'Brien, Rubinstein Associates, Inc., distributed a paper entitled "Comparative Returns From Portfolio Insurance and Compound Portfolio Insurance."

At the Q Group Seminar in the Spring of 1984, Mark Rubinstein had made a presentation on the use of portfolio insurance. (See presentation No. 22, following.) Portfolio insurance guarantees a minimum return on a protected investment portfolio. In effect, it eliminates the portion of the distribution of returns below a specified acceptable minimum. In doing so, it will reduce the expected return of the distribution. Simple portfolio insurance usually involves a combination of an investment in a reserve asset (referred to here as cash) and an investment in a call option on a risky asset. O'Brien posed the question: If it is useful to make use of cash and an option on a single risky asset to achieve portfolio insurance, then might it not be even better to invest in cash plus options on several risky assets? The purpose of the presentation was to demonstrate the difference in results between working with an option on a single risky asset and working with an option on more than one risky asset.

O'Brien began with a simple example of insurance, making use of a single call option. Assume we start with $100, have a one-year horizon, and want to be assured of having the $100 intact at the horizon. If the current interest rate available is 8 percent, then we invest $92.59 in an 8 percent bill, which will amount to $100 at the end of one year, and we invest $7.41 in a call on 0.954 shares of stock (with an expected return of 14 percent and standard deviation of 18 percent), priced at 100 with a striking price of 100. Our return depends upon whether the price of the stock is above the striking price at the end of a year. If it is not, then our return is zero. If it is, then our return is 0.954 times the return on the stock. Had we simply bought the stock, our return would have been the stock return itself, so the insurance premium we have paid is 4.6 percent of our initial $100. One can then weigh the 4.6 percent premium against the benefits of a guarantee of not losing money.

Ferguson extended the example to compound or multiple insurance, using options on both a stock and a bond. In this case the call is on the better-performing of 0.938 shares of stock or 0.938 bonds (with the current price of the stock and the bond at 100, and the striking price for each also at 100). The insurance premium has now gone up to 6.2 percent. It turns out that compound portfolio insurance is relatively expensive if the guaranteed minimum annual return is quite low, but at higher guaranteed minimum annual returns it becomes just about as costly as the simple portfolio insurance. The maximum guaranteed return of course is the Treasury bill yield.

Ferguson displayed a number of payoff patterns comparing simple portfolio insurance with compound portfolio insurance, and a number of distributions of expected rates of return. The compound portfolio insurance generally offers more attractive payoffs when the return on the underlying asset is very low, and less attractive payoffs when the return on the underlying asset is high. But as the minimum guaranteed return rises toward the Treasury bill interest rate, the patterns come together.

O'Brien summarized his presentation with four conclusions. First, both the simple and the compound portfolio insurance can guarantee a minimum return on a portfolio, but they produce substantially different probability distributions of the expected return. Second, at a high guaranteed minimum rate, the distributions become equivalent. Third, at low guaranteed minimum rates, the compound portfolio insurance forces equal allocation to bond and stock call options and is unattractive relative to simple portfolio insurance. And fourth, if the criterion is to maximize expected rate of return subject to a guaranteed minimum, then simple portfolio insurance is better than compound insurance. His guess was that in most institutional situations the simple portfolio insurance will be preferred to the compound portfolio insurance.

22. ALTERNATIVE PATHS TO PORTFOLIO INSURANCE (Spring, 1984)

Mark Rubinstein, Principal in Leland, O'Brien, Rubinstein Associates, distributed a paper entitled "Alternative Paths to Portfolio Insurance."

Rubinstein discussed some principles of portfolio insurance and a number of techniques for obtaining insurance benefits. He defined portfolio insurance in its purest and simplest form as "equivalent to a securities position comprised of an underlying portfolio plus an insurance policy that guarantees the insured portfolio against loss through a specified policy expiration date." Expanding on this definition, he stated three properties of portfolio insurance. The first is that the probability of experiencing any losses is zero. The second property can be stated as "should the position show a profit, given the rate of return that would have been earned by investing all your funds in the S&P 500, a return of the position can be predicted in advance with certainty." Another way of stating this property is to say that the expected return will be path independent. It makes no difference whether the market rises and then falls, falls and then rises, or goes through any particular gyration. Only the level at the horizon date matters.

The third property is stated as "if you restrict yourself to investments in the S&P 500 and lending cash, if the expected rate of return on the S&P 500 is always greater than that on cash, and if the insurance is fairly priced, then among all investment strategies possessing the first and second properties, the insured portfolio strategy has the highest expected rate of return."

Some forms of portfolio insurance possess all three properties, some only the first two, some the first, and some may not necessarily limit losses to zero. Stoploss orders can be considered a form of portfolio insurance. Continued use of stoploss orders can guarantee zero losses, although as a practical matter guarantee of only minimum loss is more likely. Stoploss orders do not offer the second property of portfolio insurance. The outcome is path dependent, and Rubinstein showed how one can calculate a measure of path dependence.

The use of a long-term European payout-protected index option (which as a practical matter is not yet available) does offer path independence. But as he showed, the expected rate of return will be lower than in the case of stoploss insurance. And in general, if one wants to reduce path dependence one must give up some expected return. More specifically, for his example of the use of stoploss protection over one year, the path dependence was 3.73 percent and the expected return was 14.7 percent. Use of the European index put option, with a price calculated on the basis of the Black-Scholes model, offered zero path dependence and a 14.3 percent expected return.

As we noted, the European options are not generally available. American listed options are an alternative, but they do have some disadvantages. They can be exercised early, and therefore they cost more than European options. They are not protected against dividends, and they have maturities of less than nine months. Indeed, as a practical matter, for index spot options the longest effective maturity is only two months, and for index futures options the longest effective maturity may be no more than three months. Listed options also have standardized striking prices, which may not match the precise striking price needed for insuring a particular portfolio.

Rubinstein predicted European index options will be available eventually. In fact, the Philadelphia Stock Exchange at one time made a proposal to the Securities and Exchange Commission to introduce European index options. On the assumption that if and when such options become available, they will be relatively short-term options, Rubinstein described the use of sequential short-term European payout protected index options as an insurance device. With six-month options, one would establish a protective put to insure a portfolio against loss for six months. At the end of the six-month period, if the market has dropped, the put will be exercised and another put purchased. If the market has risen, the put will not be exercised but will be replaced by a second put. In this case, however, it will be practical to buy a new put with a fairly high striking price, for the protection sought is simply to avoid loss from the original investment, and already a gain has been established. Once again, then, the strategy is path dependent. And the shorter the maturity of the put option, the greater the path dependence and the lower the expected rate of return.

Rubinstein concluded with a discussion of some of the simplifying assumptions that lay behind his model, indicating the consequences of a relaxation of these assumptions. By and large, the effect of relaxing the assumptions was to complicate the process of using the insurance devices without significantly increasing their effectiveness.

23. PANEL DISCUSSION: THE SPONSOR'S VIEW (Spring, 1985)

Eugene E. Record, Jr., Vice President of Thorndike, Doran, Paine and Lewis, introduced a panel representing plan sponsors. A second panel discussion, representing the consultant viewpoint, follows as presentation No. 24.

A. Normal Portfolios for Active Managers

Edward P. Rennie, Director, Pension Fund Investments, Bell Atlantic Corporation, described the unique opportunity his company was given to build a whole new pension plan when the break-up of the Bell System brought back to Bell Atlantic its $6 billion of pension plan assets.

Bell Atlantic embarked on a quantitative and qualitative evaluation of each of thirteen active equity managers, as a basis for deciding which managers to retain and which to terminate. At the same time, the company needed to establish what sort of aggregate portfolio was appropriate, and what combination of asset classes and management styles fitted its needs.

One of the first questions to be decided was a standard against which to evaluate managers. Working with BARRA consultants, Bell Atlantic decided to evaluate managers against benchmark portfolios for the quality of their timing, their industry selections, sector selections, and stock selections. Rennie saw in benchmark portfolio analysis a way of clearly identifying a manager's skills, and also making it possible to apply the quantitative techniques becoming available for portfolio measurement and control.

The company negotiated benchmark portfolios with each of its equity managers. The portfolios were described by means of a list of actual securities, rather than by way of portfolio characteristics. Each benchmark portfolio consisted of from 200 to 700 securities. In developing weightings for the securities, desired portfolio risk characteristics were important.

Developing the benchmark portfolios was a time-consuming activity, one requiring a great deal of cooperation among managers, the consultant, and the sponsor. Each manager was asked for monthly portfolios for the preceding five years. Quarterly and annual performance measures were developed, comparing each manager against the S&P 500 Index and also against the appropriate benchmark portfolio. Confidence measures were developed to go along with the rate of return measures, and Rennie showed how judgments about a manager's performance, based on comparisons with the S&P 500 Index, might be reinforced or dramatically changed on the basis of the return and confidence measures relating to the benchmark performance.

The quantitative evaluation was followed up by qualitative analysis of the managers' philosophy, processes used in decision making, people, and business plan.

Rennie closed by observing that Bell Atlantic terminated a number of managers on the basis of what it believed to be a thoroughly documented analysis of strengths and weaknesses. The company since has been able to work with the managers that have been retained with a clear understanding of what their strengths and weaknesses appear to be.

B. The Aggregate Normal Portfolio and the Sponsor's Report Card

Robert E. Shultz, Director of Retirement Funds, IBM Corporation, observed that while Rennie had focused on the use of individual benchmark portfolios for judging managers, he would deal primarily with the aggregate normal portfolio. After expressing dissatisfaction with the performance measurement process as it can be found at most plan sponsors, Shultz described the functions of a normal portfolio. One is to enhance the relations between the sponsor and the manager. It turns out that in the process of arriving at agreement on normal portfolios, managers generally gain a better understanding of just what it is they do and what they are expected to do. A second function achieves a proper attribution of performance between the manager and the sponsor. Shultz's point was that performance measurement, as it is generally practiced, often confuses the role of the sponsor and the role of the manager in producing overall investment results. With respect to the aggregate normal portfolio, as opposed to individual benchmark portfolios, a major benefit to the sponsor is reconciling expectations with reality. The sponsor is in a much better position to take a realistic view of probable investment performance.

In describing how IBM went about building normal portfolios, Shultz said they had relied on BARRA to develop a list of securities based on appropriate factors. Weighting the individual securities is a difficult process, and Shultz indicated that he was not yet entirely satisfied with the method being used. Like Rennie, Shultz had found a number of managers were mildly hostile when the process of developing benchmark portfolios began, and that the process took a very long time. But he, too, said that the managers in the end found the experience beneficial for themselves. Development of the normal portfolio for any particular manager is a matter of negotiation. One way to begin is with a universe of securities obviously larger than the one the manager is likely to make use of. The universe can then be narrowed down by lopping off sectors the manager agrees do not fit its style. A good beginning point for establishing weightings of the securities in the universe can be the average holdings of the manager during the preceding five years.

One of the most useful consequences of the establishment of normal portfolios for IBM was the realization of the relatively small amount of return that a manager can be expected to add to the performance of the appropriate normal portfolio. This invites closer scrutiny of fees and transactions costs, something Shultz felt tended to be overlooked by sponsors, who may have an exaggerated idea of the value a manager can add.

C. The Use of Duration Analysis in Asset Allocation

Richard P. McGahan, Manager, Pension Asset Management, Monsanto Company, described his company's work in establishing duration measures for pension liabilities. Roger Murray had suggested to the Monsanto Board of Directors that it might be appropriate to attempt to match the durations of pension fund assets and liabilities, in an effort to reduce interest rate risk for the plan. It turned out that for active employees the duration of pension liabilities was 19.2 years. McGahan thought this long duration probably allowed for substantial freedom in investment of the corresponding assets. For the inactive plan participants the duration was 7.1 years, which McGahan thought might make the use of a dedicated portfolio attractive.

As the determination of the duration of liabilities for the plan had been estimated for Monsanto by Morgan Guaranty Trust Company, Joel Swanson of that bank added to McGahan's presentation a brief discussion of the history and use of the duration measure. Estimating duration for equities presents special problems, because equity values will change with both changes in interest rates and changes in expected cash flows. Morgan had estimated a fifteen-year duration for income/basic value stocks, twenty-seven years for quality growth stocks, twenty-five years for international equities, for a twenty-two-year duration estimate for the weighted average of equities held by the Monsanto pension plan.

D. Coping with the Correlation between the Investment Assets and the Firm's Line of Business

Arthur Williams, III, Vice President, Pension Fund Investments, Merrill Lynch, Pierce, Fenner & Smith, began with the general issue of the extent to which the investment policy for a pension fund should fit the business of the sponsor. In the case of Merrill Lynch, when the sponsor is doing well (when securities markets are rising), the pension fund is likely to be doing well, and when the sponsor is performing badly, the fund is likely to be doing badly. Protection of the participants in the pension fund, and indirectly participation of the sponsor itself, may call for an investment policy that diversifies the assets of the pension plan such that its fortunes are not highly correlated with the fortunes of the sponsor.

Another argument, however, can be advanced to the effect that just the opposite policy is appropriate. Williams discussed the case for investing the assets of a pension plan in the stock of the sponsor corporation, at least in the case of a fairly well-diversified sponsor. When the sponsor's business is prospering, employees will be added, and potential pension plan liabilities will rise. On the other hand, when the business of the sponsor suffers, employees will be laid off, and potential pension liabilities will decline. So the value of the pension fund asset will tend to rise and fall as the potential liabilities rise and fall.

Given two plausible and conflicting theories for the appropriate diversification of pension fund assets with respect to the business of the sponsor, Williams closed by suggesting that some research might be directed at resolving the dilemma.

24. PANEL DISCUSSION: CONSULTANTS' VIEWS (Spring, 1985)

Martin L. Leibowitz, Managing Director, Bond Portfolio Analysis Group, Salomon Brothers, Inc., introduced a panel of consultants. This panel had been preceded by one representing plan sponsors (presentation No. 23).

Peter O. Dietz, Senior Vice President and Director of Research, Frank Russell Co., stressed the importance of foreign assets as a class or subclass within the normal portfolio of a pension fund. It becomes important to establish the extent to which domestic managers are permitted to invest in ADRs and Yankee bonds, and therefore the extent to which these securities should be included in their normal or benchmark portfolios. Similarly, it is important to establish whether overseas managers are permitted to invest in United States domestic securities.

Apart from defining the scope of investment for domestic and overseas managers, some other aspects of establishing normal portfolios in the case of international investing present difficulty. Portfolios of foreign securities may show quite different weightings from domestic securities portfolios in terms of capitalization size, yield, market-to-book ratio, economic sectors, and earnings trends. What may be more troublesome is the role of United States companies doing substantial businesses worldwide. Dietz showed the effect on the Russell 3,000 Index of removing companies doing business in South Africa. Significant differences in weightings by size, economic sector, and earnings trend resulted.

William A. Dreher, Principal, Peat, Marwick, Mitchell & Co., presented what he called a contrarian view. He suggested that it is easy to be carried away with computing power and computer models. But simpler models actually may prove more valuable. The critical variables in a multi-asset investment policy model are the expected returns for each class of asset, the standard deviation of expected returns, the fees and transactions costs, and the correlations among the returns on different asset categories. Too much reliance on historic data for these four variables is dangerous. Projections, on the other hand, suffer from serious limitations.

Pursuing his thesis that less may be more in modeling pension fund policy alternatives, Dreher put forward three examples. The first demonstrated that guaranteed investment contracts may be a better proposition for pension funds than traditional actively managed bond portfolios. They currently offer a 12 percent rate of return guaranteed for five years, while an expected rate of return for an actively managed bond portfolio lies between 10 and 11 percent, with no guarantee. His second example showed that pension fund equity portfolios should have a significant fraction of non-United States equities, perhaps as much as 30 percent. And his third example showed the superiority of a strategy of investing in cash equivalents and call options on stocks over direct investment in the equity market.

Louis Kingsland, Senior Vice President, Callan Associates, distributed a paper entitled "Asset Allocation and the Normal Portfolio." He posed two questions relevant to the use of normal portfolios. The first was: "Is it possible to identify market sectors that will provide superior rates of return?" And the second was: "Is it possible to identify investment managers who have the skill to produce superior rates of return?" Depending upon how a plan sponsor answers these two questions, Kingsland suggested that there are four general strategies to follow. If the answer to both questions is "no," then the entire pension fund should be indexed. If the answer to the first question is "yes" and the answer to the second question is "no," then the sponsor should invest in passively managed portfolios concentrated in the sectors that are expected to produce superior results. If the answer to the first question is "no," while the answer to the second question is "yes," then the sponsor should make use of superior active managers, but should complement the active portfolios with what Kingsland called a "completeness fund." The completeness fund would consist of a number of index funds, achieving passive participation in the sectors not covered by the active managers, so that overall the pension fund assets would be invested across all sectors. And if the answer to both questions is "yes," then the sponsor should hire superior active managers and establish normal portfolios to be used as benchmarks for each.

Andrew Rudd, Managing Director, Barr Rosenberg Associates, elaborated on the concept of the normal portfolio to show that the investment process involves a number of actual and hypothetical portfolios. The aggregate managed portfolio is the actual aggregate of all the managed funds of the pension plan. This aggregate managed portfolio can be seen as a combination of the aggregate active portfolio and the aggregate normal portfolio. The difference between the results of those two portfolios measures the value added by the active managers. The aggregate normal portfolio, in turn, can be seen as a combination of the sponsor's target portfolio and what Rudd called the "normal misfit portfolio." The sponsor's target portfolio is the ideal the sponsor had in mind, and the normal misfit portfolio represents the failure to reach that ideal. Finally, the sponsor's target portfolio represents a combination of the equilibrium investment portfolio and the hedge portfolio. The equilibrium investment portfolio is the portfolio devised to produce the best overall return and risk characteristics. The hedge portfolio represents adaptation of the pension plan investments to remove risk exposures that are particularly objectionable to the plan's sponsor, at some expected cost in terms of investment performance.

Turning to the use of normal portfolios for judging the performance of individual managers, Rudd pointed out that managers invest in diverse universes and follow different capitalization weighting strategies. (His experience is that in the United Kingdom managers tend to use the same universe and the same weightings, while in Japan managers tend to show more diversity than is found in the United States with respect to universes and weightings.) Much of the performance differences among managers then will result from their use of different habitats and different exposures to factors like capitalization size. But these differences do not in general reflect quality of management. The use of a normal portfolio as a benchmark allows evaluation of the components of performance that are due to skill, rather than chance. The factor exposures of the normal portfolio will identify the controllable risk exposure to which the pension plan is subject. And the normal portfolio will offer key insights into the investment process, something that both Rennie and Shultz referred to in the course of the preceding panel discussion.

In concluding, Rudd offered examples, similar to some put forward by Rennie and Shultz (in presentation No. 23), to show that comparison of manager's performance to the performance of a normal portfolio can give a dramatically different view of that manager's intrinsic quality from comparison of the manager against the S&P 500 Index.

25. FUNDING AND ASSET ALLOCATION IN CORPORATE PENSION PLANS:AN EMPIRICAL INVESTIGATION (Spring, 1985)

Randall Morck, Assistant Professor, Boston University School of Management, distributed a paper entitled "An Empirical Investigation of Corporate Pension Policy," co-written by Zvi Bodie, Jay O. Light, and Robert A. Taggart, Jr.

Morck introduced his paper as a study of how pension funds actually invest their money. There are two views of the role of the pension fund manager. The first pictures the manager as the agent of the employee-beneficiaries of the pension fund, seeking to further their interests through investment policy. While it is clear that the interests of the beneficiaries are best served if the plan is well funded, it is not clear just what asset allocation would be considered in their best interest.

A second view, which Morck described as the financial view, pictures the fund manager as an agent of the sponsor's stockholders. Given this view, it is easier to predict the investment strategy: If the sponsor is paying a substantial tax rate, one would anticipate maximum contributions and heavy investment in taxable bonds, because these are among the least attractive investments for taxpaying investors. PBGC insurance provides an incentive for sponsors in financial difficulty or close to it to provide minimum funding to a pension fund and to invest in high-risk securities. The investment strategy under this second view then may depend upon the tax status of the sponsor and its financial strength or weakness.

Morck next described a series of quantitative tests performed on data for corporate pension plans. The first test took the form of a regression analysis, in which the discount rate used by the sponsor in determining the value of liabilities was regressed on the inflation-adjusted return on net assets. A statistically significant, negative relationship demonstrated that more profitable firms tend to choose lower discount rates and hence attribute large present values to their pension liabilities, paving the way for a high rate of contributions. This was a predictable result, assuming the financial view of pension fund managers as agents of the sponsors' stockholders.

The second analysis regressed the level of funding (using a common discount rate for all sponsors) on profitability, tax status, and financial strength as represented by bond ratings. High profitability was accompanied by overfunding, as were high taxes and high bond ratings, although the significance levels for the tax and bond rating variables were low. These results confirmed the prediction that financially strong sponsors paying high tax rates would tend to overfund, while financially weak sponsors would tend to underfund.

The third stage turned from the extent of over- or underfunding to the asset mix. First, a distribution of fixed-income securities as a proportion of pension assets was clearly bimodal. A substantial number of pension funds were invested 100 percent in fixed-income securities. The next most common percentage was between 40 and 50 percent. It turned out that all the sponsors whose pension funds were invested 100 percent in bonds were highly taxed corporations. But a number of highly taxed corporations had smaller proportions. This second group might then represent the first view of the pension manager, as an agent representing the best interests of the beneficiaries rather than the interests of the sponsor's stockholders.

A regression of the percentage of the fund invested in fixed-income securities on three independent variables–plan size, degree of funding, and financial strength represented by bond rating–produced some expected and some unexpected results. A high proportion in bonds went with a high degree of funding. This was consistent with the financial view of the fund manager. But a low level of bond investment went with large size of pension plan, and this was hard to explain. Morck suggested that the equity emphasis may be consistent with the tendency of large defined-benefit pension plans to give their participants post-retirement benefit increases. Finally, the lower the bond rating (the greater the financial risk of the sponsor), the greater the proportion of the pension fund held in bonds. This finding contradicted the expectation that the PBGC insurance feature would encourage financially weak sponsors to invest in high-risk securities.

In summary, the research had produced three quantitative results: The reporting of pension fund liabilities is systematically linked to company profitability through the choice of a discount rate, with the more profitable sponsors choosing low discount rates and hence tending to exaggerate liabilities. Second, the level of pension funding is positively related to sponsor profitability, with highly profitable sponsors seeking large pension contributions. And third, the proportion of pension assets invested in fixed-income securities is positively related to the level of funding, while a significant fraction of sponsors invest pension funds only in fixed-income securities. The significance of tax burden and financial strength and weakness was found to be limited. Only among the firms with the heaviest tax burdens was there a significant relationship between the level of funding and the tax burden. And only among the riskiest firms was there a clear negative relationship between the degree of funding and financial risk. There was some evidence in the asset allocation analysis that the corporate financial perspective (pension fund manager representing sponsor's stockholders) may be more appropriate for small pension plans, while the traditional perspective (manager representing plan beneficiaries) is more appropriate for large plans.

26. ECONOMIC BURDEN OF CORPORATE PENSION LIABILITIES (Fall, 1984)

Richard A. Ippolito, Director, Office of Policy and Research, United States Department of Labor, distributed a paper entitled "The Economic Burden of Corporate Pension Liabilities."

The essence of Ippolito's presentation was that true economic corporate pension liabilities are significantly greater than reported liabilities. Reported liabilities are based on the "legal" contract view of pension liabilities. Ippolito argued, however, that true pension liabilities derive from an "implicit" contract between workers and employers.

He began by describing his purpose as not so much to identify the degree of funding of pension liabilities as to suggest a better way of looking at these liabilities and understanding their magnitude. An employee pension depends on a contract between the employee and the employer. The pension is not a corporate gift; the employer takes on a liability, and the employee gives up a portion of the cash wage in exchange for a pension promise. Ippolito referred to extensive research on the difference between wages paid to employees who were promised pension benefits and wages paid to those who could not expect pensions. Ippolito argued further that sustainable economic equilibrium calls for all employers in the long run to pay a competitive wage package, and the package includes a promise of pension benefits. The point is that whatever the legal right of the employer to terminate a pension plan, employees in general apparently trust employers not to terminate the plan, and furthermore, in general they trust that employers will pay pensions based on final wage and approximately indexed to inflation after retirement.

The reduction in wages that an employee is willing to accept in return for the promise of a pension Ippolito characterized as "deposits" that employees have made with an employer in exchange for the pension promise. The deposit can be thought of as a "perceived" pension accrual. That is, the employee can regard this deposit as the addition to the accrued value of his or her pension promise.

Turning to the "legal" contract theory, Ippolito observed that if employees see themselves as having no more than their bare legal rights, then young employees will place little or no value on a pension expectation and will be unwilling to give up any cash wage in exchange for a pension expectation. At the same time, employees close to retirement age will place a high value on the pension expectation and will be willing to take a substantially reduced cash wage in exchange for the pension promise.

Ippolito showed in graphical form the pattern of cash wage and total compensation (cash wage plus the employee "deposit") for two cases: the "legal" contract case and the "implicit" contract case. In the former, the difference between the total compensation package and the cash wage–the "deposit"–is very small in the early years of employment and becomes very large in the later years. In the case of the "implicit" contract, this "deposit" is fairly constant over the employee's working life. Empirical data, according to Ippolito, supports the configuration that accompanies the "implicit" contract theory.

From the "implicit" contract theory, some interesting numerical results follow. For 1978, Ippolito's tables showed an average funding ratio of 65.5 percent and for 1981, an average funding ratio of 76.8 percent. The corresponding ratios based on company reports were 79.9 percent and 100.8 percent. The state of funding, then, given by the "implicit" contract theory is dramatically different from that given by the "legal" contract theory.

A number of questions were raised by participants. One observed that the dependability of pension promises, and hence the likelihood that employees would sacrifice a cash wage in anticipation of a pension, will vary substantially across different employers. Ippolito agreed, and said this was another subject for research. Another participant asked whether there is any correlation between plan terminations and stock price performance. Ippolito had argued that stock prices probably reflect the real pension liability based on the "implicit" contract. In this case, then, a plan termination might be expected to produce an increase in the employer's stock price. Ippolito said he had not yet investigated this possibility.

27. UPDATE ON THE FASB PENSION PROJECT (Fall, 1984)

Frank E. Block, Member, Financial Accounting Standards Board, distributed a paper entitled "Current Status of FASB's Pension Project."

This presentation was a follow-up on an earlier one given at the Spring, 1981 Q Group seminar. Block had anticipated that by the time of the Fall seminar the Board would have published an Exposure Draft on pension accounting, but that had been rescheduled for March 1985. His remarks were directed then primarily to the document "Preliminary Views" issued by the FASB in November 1982, the reactions to those views, and his own thoughts as to what may be an appropriate set of pension accounting standards.

He reviewed briefly the essential proposals of the "Preliminary Views." The balance sheet of a corporation would be required to include a net pension liability (or asset). The calculation of the net pension liability would begin with pension benefit obligations, calculated as the present value of accumulated benefits earned to date with salary progression. The calculation is called the "projected unit credit method." The fair market value of pension plan assets is subtracted from the obligation. Finally, a "measurement valuation allowance" is added or subtracted. This allowance consists of unamortized actuarial gains and losses. A second balance sheet item would be "pension good will" arising at the time of initiation or of a change in the pension plan that results in credit being given for prior service. Pension expense on the income statement would consist of the increase in the pension benefit obligation due to employee service, plus interest on this obligation, less interest on the plan assets, plus amortization of the pension good will item, plus or minus amortization of the measurement valuation allowance.

Block commented that the Board had expected a response of resounding apathy to the "Preliminary Views," but what it got was enthusiastic opposition. At public hearings the Board was able to identify the sources of most objections, as well as points on which there seemed to be widespread acceptance of proposed methodology. For example, there seemed to be agreement that some narrowing in the range of permitted actuarial cost methods would be helpful. There was also agreement that amortization of prior service costs and actuarial gains and losses over the lives of the existing work force was more appropriate than amortization over the longer period of thirty years. There was some agreement that a company, despite its apparent legal position, has a liability at least for the unfunded, vested pension benefits.

Block indicated that the Board has a strong preference for a single method for reporting pension expense. Probably the "accumulated benefits with salary progression" method is its first choice. The Board is also likely to favor a minimum liability on the balance sheet recording unfunded vested benefits. If a liability is to be recorded on the balance sheet, then probably there will be an asset as well for overfunded plans.

His final comments were directed to post-employment benefits other than pensions. He commented that medical care expenses for retired employees can be quite substantial, and may actually exceed the cost of pensions. Most companies use pay-as-you-go accounting, but a few accrue a liability during working years and a very few fund the liability for medical care.

In answer to a question, Block said that stock prices probably accurately reflect true pension liabilities. The market seems to be assessing pension liabilities at about 140 percent of accumulated benefits without salary progression. This suggests that the market is adding salary progression in its estimate of true liabilities. One participant suggested that footnote disclosure might be a satisfactory alternative to adjustments to the balance sheet and income statement to reflect pension liabilities and costs. Block replied that one way or another he is confident that the Board will require full disclosure.

28. THE PENSION SYSTEM: A SYSTEM IN CHANGE (Fall, 1983)

Douglas A. Love, Chairman, Buck Pension Fund Services, Buck Consultants, opened the Fall 1983 Seminar with what he characterized as a "provocative collage rather than a thesis." The pension industry is strong and its continued health is assured, he said. But the structure of the industry is an artifact of tax and other legislation. Structural changes following new legislation will affect the kinds of benefits offered, how the benefits are financed, and how they are used, who will manage pension funds, and what investment assets will be used.

Love gave two reasons for optimism. The first was a prediction of large and growing real earned income for average American workers. The second has to do with the disappearance of the tradition that the younger members of the family support the older members, and its replacement by the Social Security philosophy by which the younger, employed portion of the population supports the retired portion through a national financial system.

Love identified a number of sources for the very large recent growth in pension fund assets, some or all of which are likely to be sources of future growth. In the 1950s and 1960s, pension funds were recognized as a major tax shelter, both for the average American individual and the corporate employer. Second, when wage and price controls were in effect, they led to substantial increases in pension benefits. Third, although total employee compensation (current wages plus pension benefits) is pretty much set by market forces, accounting practices have reduced the apparent cost to a corporation of pension compensation as opposed to current compensation, and hence made pensions attractive. Fourth, until the enactment of ERISA, pension liabilities were limited to the assets of the pension trust, so that a good deal of the investment risk in the pension fund was borne by employees.

ERISA brought about substantial change. Love expressed his disappointment with important aspects of ERISA. First, ERISA gave pension oversight responsibility to the Labor Department rather than to the Securities and Exchange Commission. The expertise that is really required, however, is the financial expertise of the SEC. Second, the structuring of the Pension Benefits Guaranty Corporation has been unfortunate. The PBGC claim to the assets of a corporation has destroyed the clear trust law foundation for pension funds. At the same time, the claim is unsatisfactory. Since it is a claim for up to 30 percent of corporate net worth, it disappears when the net worth is reduced to zero. In theory, the PBGC may protect itself by bringing about the termination of a pension plan if the plan is inadequately funded and the corporation is financially weak. But as a practical matter, the PBGC cannot threaten weak corporations. Giving a stronger creditor claim to the PBGC would improve the system, but serious difficulties would still remain. The PBGC is expected to insure pension funds, but its liabilities are not properly diversified, and without diversification true insurance is not possible. A financially weak corporation, by promising substantial benefits but underfunding its pension plan, can place a substantial burden on the PBGC, leading either to ultimate benefits for employees paid for by stronger corporations via the PBGC, or (as in the case of Chrysler Corporation) to irresistable pressure on the federal government to keep the corporation going. Using the PBGC has become part of a corporate financial strategy in many cases, and corporate finance and pension finance have been inextricably linked.

Love pointed out that the PBGC guarantee (with a ceiling of $1,500 per month for a beneficiary) has provided virtually complete protection for rank and file workers. Only executives with large potential pensions are at risk. He observed that Chrysler had fully funded its executive retirement plan, but had left its union employees' plan substantially underfunded. This was not a matter of distress to the unions, since the PBGC could be counted on to take care of their members.

Love referred briefly to the practice of recapturing assets from overfunded plans. Legislation has been introduced in Congress to declare that a corporation may not recapture pension assets. His opinion was that the legislation would lead to substantially reduced pension plan funding.

He concluded his talk with a discussion of what he sees on the horizon. Recent changes in tax and other legislation favor a shift from defined benefit plans to profit sharing and defined contribution plans. A move to defined contribution plans will have some important consequences. First, fund assets will tend to be strictly conventional, because these plans are really being sold to employees rather than to corporations. Sophisticated computer processing of the multitude of employee accounts will be important. Both changes will tend to favor banks and mutual funds as managers.

A shift to defined contribution plans will also prove very costly to corporations in two ways that do not yet seem obvious to the financial community. As investment risk is shifted entirely to employees, corporations will find they must offer greater expected benefits to accompany the increase in risk. Second, defined benefit plans do not offer the flexibility in timing contributions that enables a corporation to maximize the tax benefits of contributions to a defined benefit plan.

One participant added to Love's warning of the disadvantages to a corporation in a defined contribution plan. He said poor investment performance produces quick criticism from a large number of employees, and administration of the plan becomes more difficult. He felt there would be greater pressure to produce superior investment results.

29. THE ECONOMICS OF PRIVATE PENSION FUNDS POST-ERISA (Fall, 1983)

A paper entitled "Economic Implications of ERISA," by Jeremy I. Bulow, Myron S. Scholes, and Peter Menell, was distributed.

Myron S. Scholes, Professor of Finance and Law, Stanford University, began by contrasting defined benefit and defined contribution plans. He observed that valuation is simple in the case of the defined contribution plan, but extremely difficult for the defined benefit plan, due to the effects of vesting rules, changes in benefits to retirees and employees, integration with Social Security, the choice of lump sum or annuity payments following retirement, the consequences of early retirement, and the link between the benefit level and the earned compensation level.

He went on to discuss why a corporation would want to establish and fund a defined benefit plan. There are two major reasons: Funding adds to the credibility of a promise of deferred compensation, and there are significant tax benefits associated with funding and especially with overfunding.

Scholes next presented a careful analysis of the exposure of the employee to the effects of unexpected changes in inflation and interest rates. Taking as an example a promised benefit defined by a percentage of final salary times years of work, he showed that so long as inflation and interest rates are as expected, and total compensation (pension contribution plus current salary) rises with inflation, then both the pension contribution and the current salary will also rise with the rate of inflation. But should inflation and interest rates rise unexpectedly during the period of employment, the corporation will find it necessary to increase the portion of total compensation dedicated to pension contribution more rapidly than the increase in total compensation. This is in order to adequately fund the pension that is related to final salary. The result will be a decline in the fraction of total compensation that is distributed as current salary, and the current salary will fail to keep pace with the rate of inflation. Generalizing from the example, Scholes observed that one would expect that in times of unanticipated increases in inflation current salaries will not keep up with the price level, although total compensation probably will.

Scholes next turned specifically to the economic effects of the ERISA legislation. Employee ownership rights have been dramatically changed. Before ERISA, one might have expected that an employee would have given up very little current salary in exchange for the promise of a pension if the pension plan were extremely risky. So if the plan in fact failed, the employee might have lost very little. Under ERISA, the pension benefit, up to $1,500 per month, is guaranteed. So even though the plan is extremely risky, the pension promise is of considerable value to the employee. Scholes pointed out, however, that the $1,500 maximum refers to the benefit payment, and for an employee who does not expect to retire for many years, the present value of the guarantee may be fairly small.

Elaborating on his earlier statement that it is extremely difficult to value a defined benefit pension plan, Scholes demonstrated how ERISA had made that valuation even more complex. One can think of the employees as being able to rely on the PBGC guarantee as a minimum. To the extent that the pension fund assets exceed this minimum, up to the accrued and vested benefits, the employees have a claim to all the fund assets. But any excess of asset value above the accrued and vested benefits belongs to the corporation's shareholders. The PBGC is involved only if the value of the assets is less than the accrued and vested benefits. In this case, the PBGC liability is the guarantee less the value of the assets in the pension fund less the PBGC claim against 30 percent of the value of the corporation's net worth. The shareholders have a claim to the excess of the value of the assets over the accrued and vested benefits. If the assets are less than the benefits but greater than the PBGC guarantee, then the shareholders have neither a claim nor a liability. But if the assets are less than the amount of the guarantee, the shareholders are obligated for the deficiency, up to a maximum of 30 percent of the corporate net worth.

These various claims and obligations have been shown by others to correspond to a series of options. The employees in effect have a call option on the value of the fund assets, but have given the corporation a call option on the excess of asset value above accrued and vested benefits. In addition, the employees have a guarantee from the PBGC. The corporation possesses the call option on the excess value of the assets, and a put option in the sense that it can abandon its pension plan by the transfer of 30 percent of its equity to the PBGC. While the option concept helps to explain how the claims and obligations of the three parties might be established, it also shows why the process of valuation is extremely complex. In addition, it raises the question of why a corporation would want to continue a defined benefit pension plan. The corporation with a badly underfunded plan could act to exercise its put option. One with a substantially overfunded plan could recover its surplus and eliminate the premium to the PBGC. There are various reasons for continuing a defined benefit plan, even when termination might appear to offer an immediate financial saving, but the primary reason lies in the tax benefit from overfunding.

The PBGC collects a premium from pension plan sponsors. This premium is in effect a tax on strong corporations with strong pension plans, and it supports the weak pension plans of weak corporations. It has been suggested that the level of the premium should be a function of the risk taken by the PBGC. But a better change would require the matching of pension fund assets and liabilities, for weak pension funds backed by weak corporations, to at least hedge the guaranteed benefits.

30. THE FINANCIAL MANAGEMENT OF PENSION PLANS: FUTURE TRENDS (Fall, 1983)

A paper by Irwin Tepper entitled "Pension Funding Strategies and the Management of Corporate Capital" was distributed.

Irwin Tepper, President, Irwin Tepper Associates, described his presentation as reporting on an innovative theory to reconcile the traditional theory of pension plan funding with the rather different practice of corporate plan sponsors. He began with a recent development in pension finance: the growing practice of withdrawing capital from pension funds to meet pressing financial needs of plan sponsors. These withdrawals have taken place to finance acquisitions, to fight takeovers, to retire debt or otherwise improve corporate balance sheets, to improve earnings, and to redirect capital from a pension fund to plant and equipment.

Such substantial withdrawal of capital from pension plans conflicts with the traditional theory of funding policy. The theory argues that plan sponsors should contribute as much as they are permitted to a pension plan, so long as there is a tax saving from the contribution. There is in theory no upper limit to the degree of overfunding, so long as tax benefits are maximized. But as a practical matter, corporations do not contribute as much to their pension plans as they are permitted, and a number of corporations have taken capital back from their pension funds. Tepper's objective was to establish a theory that would explain corporate behavior.

The most important argument for a limit to pension plan funding, Tepper had concluded, was the loss of financial flexibility. Tying up funds in a pension plan increases the likelihood of financial distress, risk of default on debt obligations, and ultimate bankruptcy. Even if disastrous consequences are not foreseen, capital rationing may become a problem. A strong corporation with a high credit rating may still experience poor earnings in a period of recession and find its borrowing capacity exhausted, unless it is to suffer a lowering of its credit rating and a consequently higher interest cost. At the same time, its stock price is likely to be depressed and it will want to avoid equity financing. Now if the corporation were able to tap its pension funds at any time, overfunding the plan would not involve any loss of flexibility.

Tepper identified three means by which a corporation might recapture funds from its pension plan. The first would involve a plan termination. Under certain conditions, it is possible to terminate an overfunded pension plan and recapture the surplus for the corporation. There are obstacles to the use of a plan termination as a means of recapturing the surplus assets. For one thing, beneficiaries of pension plans frequently bring lawsuits over plan terminations, and the PBGC may also sue the corporation. At best, there will be expensive and time-consuming litigation, and the corporation is quite likely to have to settle with the beneficiaries, giving them a part of the surplus that in principle belongs to it. There are also risks implicit in failure to meet all the conditions for surplus recapture on a termination, and there is some possibility that new legislation may threaten surplus recapture. All in all, Tepper concluded that plan termination is not an attractive way to recapture a plan surplus.

Tepper's second way of recovering surplus is by way of reductions in contributions. There may be some difficulty in obtaining the concurrence of the corporation's actuaries in the reduction the corporation would like to achieve, but the greatest difficulty lies in the length of time it will take to recapture a plan surplus through contribution reduction. This second method of surplus recapture, then, is not very satisfactory.

Tepper's conclusion at this point was that an accumulation of surplus value in the pension fund increases the present value of the cost of future financial distress through the corporation. The greater the surplus, the more likely the corporation will face a cash flow squeeze, and the higher the cost in the event of financial strain. All this argues against unlimited funding, despite the tax benefits.

The verbal rationale for a limit to refunding led Tepper to develop a model, essentially an investment decision model, that would establish the optimal level of funding. The model calculates, as a function of the level of the funding surplus, the net present value of the surplus. Traditional theory, recognizing only the tax benefit of contributions, would indicate that the larger the level of the surplus, the greater the net present value. Tepper's model, incorporating the advantage to the corporation of access to the funds represented by the surplus, and the length of time required to recover a surplus from the pension fund, generally shows the net present value rising with the size of the surplus to a maximum value, and then declining. The model is a simple one, incorporating two time periods: a period during which there is no financial distress and the corporation is able to establish a surplus in the pension fund, and a second period during which the corporation is in need of funds and will recapture as much as it can of the pension fund surplus through a reduction in contributions. It turns out that the key variables in the model are the length of the first time period, the opportunity cost of capital during the second time period, the tax rate, and the rate at which the corporation can recapture the surplus in its pension plan.

While the model is a simple one, Tepper argued that it is the first to prescribe a pension funding policy that is reasonably in accord with corporate practice.

31. DEFINED BENEFIT PENSION PLANS: RICH OR POOR? (Fall, 1983)

A book by D. Don Ezra, entitled "The Struggle for Pension Fund Wealth," was distributed.

Keith P. Ambachtsheer and D. Don Ezra, Principals, Pension Finance Associates, Ltd., made a presentation based on a recently completed study of 146 Canadian private sector pension plans. Ambachtsheer began by pointing out the serious limitations in information available for pension plans, and the consequent confusion in perceptions of those plans. One can read commentaries that characterize corporate pension plans as not only strong but also carrying surpluses that should be stripped away, and at the same time other commentaries warning of the weaknesses in these plans. The study he and Don Ezra had undertaken represented something of a breakthrough in that Ezra had been able to convert the limited amount of data available on a set of pension funds into informative fund valuation figures.

Ezra continued the presentation, setting out the function of the actuary with respect to a corporate pension plan. The essence of the actuary's job is to identify a funding target for the pension fund. This target is sometimes referred to as the "liability" of the fund, a term that is misleading. Once a funding target has been established, the required contribution can be determined as the annual amount necessary to bring the fund to the target. In the process of establishing the funding target, the actuary must consider a sort of safety cushion. The cushion could be made explicit, as the degree of funding the actuary feels necessary to allow for unexpected adverse circumstances. Or it can be left implicit. In practice, the cushion is usually implicit, and this has some important consequences.

In times of stable inflation and interest rates, defined benefit plans are generally career average plans, the actuarial assumptions reflect current conditions, and there appears little need for a safety cushion. In times of volatile inflation and interest rates, plans are more likely to be based on final average salary and may incorporate some indexing. A safety cushion becomes important, but the tendency on the part of the actuary is to keep the assumptions of the stable environment unchanged, to produce an implicit cushion. The end result then is a set of assumptions that may seem to some to be out of step with the times, but that will nevertheless produce a funding target that reflects a "most likely" case with a safety cushion. Indeed, the implicit safety cushion approach has become so well established that supervisory authorities tend to regard an explicit cushion as unusual and unacceptable. To the extent that the cushion can be identified, however, it raises some serious questions. In Canada, there has been considerable discussion of who own this cushion–whether it belongs to the corporation or to the pension beneficiaries. And serious consideration has been given in Canada to legislating away what has been called the "excess interest," that is the earnings above the actuarial rate.

What Ambachtsheer and Ezra were aiming at in their studies were best estimates of the accrued obligations of Canadian pension plans, so as to establish some benchmark for the funded status of pension plans on a national scale. They were able to get somewhat limited data from corporations and from Statistics Canada, covering 146 pension plans, and enough aggregate data to make it possible to extrapolate the findings from the sample to reach some conclusions with respect to the status of the Canadian private sector pension system.

The key to the study was the development of a methodology for transforming actuarial valuations for pension plans from one set of actuarial assumptions to another. One could obtain an actuarial valuation based upon a particular set of assumptions, and one needed to be able to recalculate the valuation for a different set of assumptions. Normally, one would need a great deal of information about an individual pension fund to be able to make the fresh valuation. Ezra developed a procedure, in which duration played a key role, that required for a particular pension plan only the value of the obligation determined by the plan actuary, the average age of the group included in the plan, the interest rate assumption, the average retirement age for those covered by the plan, and the average age of those on pension. From the age data and the interest rate assumption it was possible to establish the duration for the pensioner group (generally four to five years) and for the active employees in the plan (generally about eighteen years).

The next step in the study was to come up with a set of assumptions, both near-term (affecting those on pension) and far-term (affecting those still in the work force) for probable investment return, salary escalation, and inflation. Actually, three sets of assumptions were established – "normal," "deflationary," and "inflationary." For the "normal" scenario, the assumptions were for investment returns of 13 percent near-term, 8.5 percent far-term, with a 10 percent blend. For salary increases the assumptions were 11 percent near-term, 7 percent far-term, with an 8.5 percent blend. And for inflation the assumptions were 10 percent near-term, 6 percent far-term, with a blend of 7.5 percent.

Ambachtsheer reported the results of testing the pension plans against these assumptions. Although a single valuation for the assets of a pension plan seemed satisfactory, five different measures of plan liability were considered important. The first was simply the accumulated value of benefits. That is, the cost to terminate the plan. The second was the value of the pension plan on a going concern basis, using the stated benefit rules in the plan. The third added a moderate degree of indexing, approximately 50 percent of full indexing because that seemed to reflect the history of Canadian plans. The fourth valuation assumed full indexing of pension benefits. Finally, the fifth determination of liability was the funding target for the plan.

The plans were divided into three groups, those using final average compensation, those using career average compensation, and those offering flat benefits. The results of applying the assumptions to the sample plans were then aggregated for these three groups. Ambachtsheer presented the results for the final average plan, indicating that for every $100 of plan assets, the liabilities for the five different measures were $33, $76, $98, $132, and $105.

Ambachtsheer went on to discuss the use of the inflationary and deflationary scenarios and the distribution of funding ration.

The overall conclusion of the study was that using the second method for estimating liability–the going concern basis using the plan as defined–$26 billion of Canadian trusteed pension plans contain about a $6 billion surplus. The policy implication of this conclusion seemed to be that plan termination insurance is just not needed in Canada, although one might want to see reduced benefit promises or a speeding up of funding in the cases of weak individual plans.

Ezra continued with a discussion of the corporate finance aspect of pension planning. He described a four-step process, beginning with the establishment of a benefit policy, continuing to the establishment of a funding policy based on bringing the plan toward ability to service the expected benefits, followed by consideration of the corporate financial policy and the tax consequences of plan funding, and concluding with the implementation of a funding plan with the help of an actuary. He concluded with some examples of the balance sheet implication of adding pension assets and liabilities to the regular corporate balance sheet. The significant point here was that the impact depends very much on the actuarial method used in determining pension liability.

32. CASE STUDY: CHANDLER CHEMICAL (Fall, 1983)

Irwin Tepper, President, Irwin Tepper Associates, conducted a discussion of the Chandler Chemical case. The case described a corporation whose chief financial officer was wondering whether to make a significant change in the funding policy for the corporate pension plan. The company's actuaries had presented alternative assumptions and methods that could lower the annual pension expense by as much as 60 percent. The company was in the midst of an ambitious capital expansion program, but had seen a significant reduction in its earnings during the recession of 1981-1982, leaving it with substantial debt, with its bond rating reduced from A to Baa, and rather limited ability to raise new capital.

Tepper began by soliciting comments on the financial condition of the corporation. The general conclusion seemed to be that it was in rather poor shape. Profits were down, as was coverage of fixed charges, and some participants felt that the corporation could be in very serious trouble within a few years.

Tepper next directed the discussion to the pension plan itself. On the basis of a very conservative actuarial interest rate assumption, the assets seemed to offer about a 12 percent cushion above the accumulated benefit liability. Some participants felt that on the basis of a more realistic interest rate, the surplus would be very much larger. There was general agreement that the pension plan was in very good shape, with some participants suggesting that an immediate termination might be sensible, and others concluding that at least a reduction in contributions was easily justified.

Tepper then shifted the focus to the specific proposal for a change in actuarial assumptions that might reduce contributions by 30 percent, and a change in the funding method that might bring about another 30 percent reduction. With respect to the assumptions, there was considerable discussion of the point that a common misconception is that changing assumptions will have no significant effect so long as the difference between the interest rate and the wage increase rate is not changed. In fact, raising the interest rate assumption by one percentage point while raising the wage inflation assumption by the same percentage point leads to a quite substantial reduction in the annual pension cost. Tepper explored just why this might be so in general, and why it would be so in this particular case.

The discussion moved on to consider the cash flow and earnings benefit to the corporation of bringing about the maximum possible reduction in annual pension fund cost. The net cash flow saving would be helpful, but was too small to have a significant impact on carrying out the capital expansion plan. The earnings impact, however, could be quite substantial.

One participant raised the question of the so-called "crossover point." If the level of contributions were to be reduced by 60 percent in 1982, one would expect that over time the contributions would have to rise, and the crossover refers to the time when those contributions would be as high as they would have been had no reduction taken place in 1982. Tepper produced a number of interesting graphs, to show the consequences in future years of maintaining the current contribution level, or taking advantage of the change in method and assumptions to reduce it by 60 percent. It turned out that the crossover point was about twelve years in the future. It also turned out that the deterioration in the funded ratio for the plan would be very small for many years, because the plan was extremely well-funded.

In conclusion, it appeared that the benefit of the 60 percent reduction in contributions could be significant in terms of earnings, and helpful in terms of cash flow. At the same time, there would apparently be no significant injury to the pension plan and no significant future adverse cash flow consequences.

33. CHANGING PUBLIC POLICY TOWARD PRIVATE PENSIONS: IMPLICATIONS FOR CORPORATE FINANCIAL MANAGEMENT (Fall, 1983)

Dallas L. Salisbury, Executive Director, Employee Benefit Research Institute, discussed the changes he sees developing in public policy with respect to pension funds. He emphasized the importance of the perception that legislators and regulators have of corporate behavior and corporate motivations with respect to pension plans. He cautioned that both corporate practitioners and researchers should give some thought to the message they are conveying to those who set the conditions for pension fund existence.

He began with some statistics on pension fund growth, dispelling the common misperception that the enactment of ERISA in 1974 has discouraged the growth and formation of defined benefit pension plans. By 1982 the number of defined benefit plans had grown to 192,000 from only 125,000 in 1975. During the same time period, total pension fund assets grew to about $887 billion from $368 billion. Salisbury commented that the magnitude of pension fund assets by itself had some significant consequences. Some legislators are concerned about the concentration of financial power, since a very large part of the capital investment resource is held by pension plans. There is further concern over the magnitude of the tax loss that results from the deductibility of pension fund contributions. For fiscal year 1983, something like $100 billion of a $200 billion deficit is represented by the tax benefit in pension plans.

Turning to likely trends in government policy, Salisbury commented that corporate financial flexibility is likely to be limited. There appears to be both a growing concern over the tax revenue loss that goes with the present pension plan system, and a conviction that corporations see tax saving as the only reason for establishing and maintaining pension plans. We may see legislation to put limits on pension fund benefits and contributions, if this conviction persists. It is also likely that Congress will be more inclined to rely on Social Security rather than on private pension plans for retirement benefits generally.

In discussing the balance between private pension plans and social security, Salisbury dealt with five current issues. One is concern over unfunded liabilities, another is the apparent abuse of plan terminations, a third is the apparent abuse of contributions (specifically illustrated by contributions in kind), a fourth has to do with benefits and specifically the need for inflation indexing, and the fifth has to do with the availability of pension benefits to employees generally.

In establishing funding targets, Salisbury suggested that plan sponsors should recognize there is Congressional pressure to tax Social Security benefits and to reduce the indexing of Social Security, which will have the effect of reducing the net benefit of Social Security to corporate employees thereby placing a greater burden on the corporate pension plan. It is also possible that Congress may impose indexing on private pension plans.

He also suggested that defined contribution plans may turn out to be less effective than plan sponsors have thought in shifting investment risk to employees. When investment returns are bad, and there is widespread suffering among beneficiaries, corporations may simply be forced to subsidize benefits.

He turned next to some industrial policy proposals put forward by Democratic candidates for president, and suggested there is a strong likelihood of pressure to divert the assets of both defined benefit and defined contribution plans toward investments considered desirable by the government.

Salisbury discussed in some detail the provisions of HR 3930, a bill introduced only two weeks previously. Among the significant provisions in this bill are an increase from $2.60 to $6.00 in the PBGC premium per employee, significant limitations on the ability of a corporation to terminate a pension plan, and a significant increase (beyond 30 percent of net worth) of the potential liability of a corporation to the PBGC.

Among the confrontations he sees emerging with respect to retirement benefits are those between voluntary and mandatory pension plans, Social Security and private pension plans, employer plans and IRAs, and defined benefit and defined contribution plans. The Congressional budget office has been considering the effects of doubling the limit on IRA contributions while halving the limits on corporate plan contributions.

Salisbury closed with four recommendations to industry in dealing with pension plans. The first is development of better information on what is going on in the legislative and regulatory world, information in particular on the perceptions of those who have the ability to change the rules. Second, industry needs to be represented when the rules are in the process of change. Third, there should be some educational effort on the part of industry, reaching Congress and bureaucrats early enough to have some influence on the planning process. And finally, corporations should be developing a pension fund strategy that incorporates the likely future changes in legislation.

34. FASB PENSION ACCOUNTING PROPOSAL: FINANCIAL ANALYSIS (Spring, 1983)

Howard E. Winklevoss, President, Winklevoss and Associates, presented a critique of the FASB proposal for the reporting of pension liabilities on a corporate balance sheet. He began by explaining the proposal itself, then turned to the actuarial implications of the proposal, and presented some examples.

In the first year after the proposal takes effect, a corporation will have to report as a liability on its balance sheet an amount labeled "net pension liability" (NPL). This amount will be explained in a footnote to the balance sheet as the difference between the "projected accrued benefit liability" (PL) and the value of pension fund assets at market (PA). Introduction of this liability will require either a reduction in equity, or introduction of a corresponding asset, to make the balance sheet balance. The proposal is that initially an asset account will appear on the balance sheet, recording "intangible pension asset" (IPA) to equal the net pension liability. Winklevoss commented that a security analyst might take the pension liability seriously as a corporate liability, but eliminate the "intangible pension asset" as having no real significance.

During the next year, two things might happen. First, the market value of the pension fund assets might change simply as a result of investment performance. Second, the projected benefits liabilities might change as a result of changes in actuarial methods or assumptions. The intention of the FASB proposal is that neither of these changes should affect the net pension liability recorded on the balance sheet. This policy reflects the practical conclusion that it is undesirable to have substantial balance sheet changes resulting from movement in the securities market and changes in actuarial procedures. In order to carry out the policy, it is necessary to create another account, "measurement valuation allowance" (MVA), so that the net pension liability is now calculated by taking the projected benefit liability, subtracting the value of the pension assets at market, and subtracting or adding (as the case may be) the measurement valuation allowance.

This procedure has some interesting consequences. Had our corporation anticipated the appearance of the net pension liability on the balance sheet, and had it wanted to minimize the size of this liability, it might have arranged a change in actuarial valuation methods to reduce the projected benefit liability. This in turn would have reduced the net pension liability. Should the company wait, however, until the second year to make this change in actuarial methodology, as noted above the change will be taken up in the measurement valuation allowance, and the net pension liability on the balance sheet will not be reduced. It therefore becomes critical to make changes in actuarial methods before the first year in which the pension liability must appear on the balance sheet. Winklevoss commented that, as the proposal stands, 1985 may be the year the new rule first becomes effective.

There will be some other interesting results of the new rule. For the most part, pension fund expense will differ from pension fund contributions. In one case he examined, Winklevoss reported that the difference between expense and contributions would amount to 8 percent of payroll, with the contributions exceeding the expense. The difference is in part due to the method by which unfunded pension liability would be amortized, and in part due to the amortization of the new MVA and IPA accounts. The consequence is likely to be that contributions, although determined on the basis of appropriate actuarial calculations, will appear extraordinarily high. As a result, there may be an inclination to reduce contributions and therefore increase the underfunding of pension plans. In addition, it may turn out that the appropriate contribution would not be fully tax-deductible.

To add to the complications, Winklevoss said, the corporation will have to choose from among at least three funding policies. One policy would follow the desired contribution level. This level would be a function of plan design and actuarial methodology and would be the one best meeting corporate objectives. A second policy would be based on the level of the reported pension expense, which can be significantly different from the contribution level. The objective could be to minimize the expense, to minimize the NPL account on the balance sheet, to maximize the IPA account on the balance sheet, or to minimize the MVA account. Finally, the policy could be geared to the ERISA rules, and involve maximizing the maximum permitted contribution or minimizing the minimum permissible contribution. Winklevoss expanded somewhat on this third alternative, to show why his suggested objective makes sense.

In conclusion, he noted that the FASB may have provided a powerful incentive for corporations to abandon defined benefit plans in favor of defined contribution plans. Although the proposal promises substantial work for consulting actuaries, Winklevoss urged the participants to voice their opinions to the FASB.

PERFORMANCE MEASUREMENT

35. QUANTITATIVE TECHNIQUES IN CLASSIFYING MANAGERS (Spring, 1983)

Peter O. Dietz, Senior Vice President, and Kelly Haughton, Assistant Vice President, Frank Russell Company, described some methodology developed by the Frank Russell Company to assist large pension plan sponsors in selecting managers.

Dietz first traced the history of multiple manager strategy. The industry appears to have reached a stage where there is concern for the choice between active and passive management and for the selection of an appropriate group of active managers. The hypothesis that Dietz set out to test was that there are four kinds of managers: defensive yield, broadly diversified, quality growth, and aggressive growth; and three kinds of asset allocation: passive core, active core, and active satellite managers. In testing the hypothesis, he wanted to refine his classification of management styles, to determine whether managers can be differentiated by the amount of residual risk in their management, to examine the performance implications of style and residual risk, and to review asset allocation.

He collected data for all managers reviewed by Frank Russell. For their equity portfolios he selected thirteen quantitative variables (later reduced to seven). For each manager he used the size of assets under management and the Russell Company category into which the managers were classified. In the end 107 portfolios were represented.

A principal components analysis was conducted on seven variables: earnings growth in the portfolio, capitalization size, yield, price-earnings ratio, beta, residual risk, and variance explained by the market. The analysis yielded two factors that together explained 80 percent of the total variance. The factor loadings suggested that the first factor might appropriately be characterized as a "growth" factor, and the second as a "residual risk" factor. All the managers could then be characterized using these two factors.

Next, Dietz looked at a graphical display of points, one for each manager, using the two factors. An intuitive review of the plot indicated that for the most part the points clustered appropriately. That is, the points for managers who seemed to have similar style tended to plot close together. On the basis of qualitative judgment, a grid of rectangles was set up to separate the plotted points into thirteen cells. The result was to classify managers into four categories by growth and five categories by risk. The table below summarizes the conclusions.

What is of particular interest is the distribution of managers and assets under management by risk class. Most of the managers are in the low-risk classes. The managers in the high-risk classes generally have on average many fewer assets under management. In general, Dietz was satisfied that he had been able to classify the managers satisfactorily and could provide useful guidance to a plan sponsor seeking genuine diversification of manager style.

Manager Classification

Growth Component Class	Number of Managers	Assets under Management in $billion Total	Average
1. (Defensive Yield)	17	13.8	0.8
2.	37	57.0	1.5
3.	51	65.1	1.3
4. (Aggressive Growth)	2	1.2	0.6
	107	137.1	
Risk Component Class			
1. (Lowest Risk)	43	81.3	1.9
2.	23	33.3	1.4
3.	26	16.6	0.6
4.	12	5.8	0.5
5. (Highest Risk)	3	.1	0.03
	107	137.1	

Kelly Haughton continued the presentation, to test the proposition that one might accomplish more with a passive core portfolio and a group of active satellite managers than by drawing entirely on active managers. More specifically, the hope would be that one could equal the performance of the active manager group while substantially reducing fees, for the fee level for a passive core would be quite low. He presented the results of a correlation, using as the dependent variable the fees paid per $100 million of portfolio managed and as the independent variables the historic quarterly alpha, the historic quarterly residual risk, and the size of assets under management, for the managers studied. The table following shows the results for seveny-six managers.

Management Fees

Fee for $100 million managed $A_0 + A_1$ (historic quarterly alpha relative to S&P 500) $+ A_2$ (historic quarterly residual risk relative to S&P 500) $+ A_3$ (log assets under management)

For 76 Managers:

Variable	Coefficient	t-ratio
A_0 (intercept)	615,700	3.86
A_1 (alpha)	71,900	3.17
A_2 (residual risk)	33,600	1.89
A_3 (log assets)	-35,900	-2.49

$$R^2 = 0.41$$

The signs on the coefficients were as expected, and all but the coefficient for residual risk were significant. Haughton found that if the alpha were removed from the regression the residual risk coefficient would become significant.

Having established the relationship among fees, the alpha, residual risk, and size of assets under management, Haughton went on to calculate, for the residual risk manager classes shown in the first table, the average fee and the standard deviation of fees for that category. The results are shown in the table below.

Factor Analysis Fee Comparison

	Risk Component Class	Average Fee per $100m	Standard Deviation
1.	(Lowest Risk)	$301,445	$ 92,221
5.	(Highest Risk)	652,812	194,704

It is quite clear that the small active managers are much more expensive than the larger, less active managers. The average fee for managers in the highest residual risk category–$652,812–is more than twice the average fee of managers in the lowest risk category–$301,445. The conclusion then was that using a passive core and active satellite managers would not make sense because the active managers are so much more expensive that their added fees are not offset by the low fees on the passive core.

Dietz closed with a listing of some of the characteristics of large and small capitalization active managers, suggesting why the large capitalization managers will generally work out best for large firms.

Large capitalization active managers for large firms are characterized by:

- Highly liquid stocks
- Large universe of managers
- Possible wide style diversification
- Low fees

Small capitalization active managers for large firms are characterized by:

- Illiquid Stocks and high transactions costs
- Limited manager universe
- Limited style diversification
- High fees

36. MONEY MANAGERS ALPHA– AN INDICATION OF CONTINUING SUCCESS?

(Spring, 1983)

Mark P. Kritzman, Vice President, Bankers Trust, reported the results of some tests of serial correlation in superior performance of investment managers employed by the Bell System.

There were three groups of managers. One consisted of all-equity managers, one of equity growth managers, and one of fixed-income managers. Each group was ranked by performance for the 1972-1976 period and for the 1977-1981 period. A regression was run, using the percentile rankings for the later period as the dependent variable and the percentile rankings for the earlier period as the independent variable. He observed that if there were perfect serial correlation between performance ranking in the earlier period and performance in the later period, the regression should yield an intercept of zero, a slope of one, and an R squared of one. If there were no correlation whatever between the rankings in the two periods, the intercept should be 50 (for the fiftieth percentile), the slope should be zero, and the R squared zero. The table following shows the regression results for the hypothetical perfect serial correlation, the zero correlation, and the three actual regressions. The results provide surprisingly strong confirmation for the proposition that there is absolutely no correlation between performance rankings in the earlier period and in the later period.

Performance Ranking Regressions

	Intercept	Slope	R squared
Hypothetical:			
Perfect correlation	0	1.0	1.0
Zero correlation	50	0.0	0.0
Actual:			
All-equity managers	51	-0.05	0.0
Equity growth managers	48	0.03	0.0
Fixed-income managers	46	0.10	0.0

Kritzman undertook a somewhat more subtle test, measuring the extent to which managers in the top quartile in the first period were also in the top quartile in the second period, repeating the test for the top half, the middle half, the bottom half, and the bottom quartile. The results are shown in the table below.

Frequency of Continuation in the Same Quartile or Half for the Second Period as for the First

	Frequency		
Quartile or Half	All-equity managers	Equity growth managers	Fixed income managers
Top Quartile	30%	50%	25%
Top Half	52	44	63
Middle Half	43	44	44
Bottom Half	50	33	63
Bottom Quartile	11	14	25

Summarizing, he drew the following possible conclusions:

1. The capital asset pricing model risk adjustment (used for the equity manager performance rankings) may not be appropriate.

2. The Standard & Poor's 500 Index (used in ranking equity managers) may not be the appropriate benchmark.

3. The results may suffer from sampling error.

4. Money manager mobility may obscure consistent performance. That is, although the firm served the Bell System for ten years, the individuals responsible for the portfolios have changed.

5. Skill in management may be obscured by the dominant impact of random events.

6. The securities market may be efficient.

PREDICTING BANKRUPTCY AND LOSS

37. A COMPARATIVE ANALYSIS OF THE VALUE LINE FINANCIAL STRENGTH MEASURE, AND THE ZETA BANKRUPTCY INDICATOR

(Spring, 1983)

A paper by Edward I. Altman and Joseph Spivack, entitled "Comparing Value Line's Relative Financial Strength System with the Zeta Bankruptcy Classification Approach," was distributed.

Edward I. Altman, Professor, New York University, began this session with some statistics on bankruptcies, indicating that in 1982 the bankruptcy rate was about what it had been in 1933; the rate reached in early 1983 was even higher. The past two or three years have demonstrated that there may be more risk in financially weak companies than most investors have realized.

Altman had described at an earlier Q Group Seminar his ZETA bankruptcy classification approach, which is a scoring system using seven factors. As some updated statistics indicated, the system has continued to demonstrate a high degree of accuracy.

Joseph Spivack, Senior Analyst, Value Line Investment Survey, next described the Value Line Relative Financial Strength System. This approach has some similarity to the ZETA model. The Value Line Investment Survey follows 1,700 stocks, and since 1977 has included a financial strength rating (from A++ to C). The rating was intended to resemble a bond rating, although Value Line is concerned exclusively with the evaluation of common stocks.

The financial strength rating is arrived at by a process that begins with a computer model. Values for each of twenty-one financial variables are calculated for all nonfinancial companies in the Value Line Survey. The values of each variable for all companies are ranked, and then divided into eight equal groups. Each variable for each company is then assigned a rank from one to eight, and these rank numbers rather than the actual values of the variables are used for subsequent calculations. Next, the set of twenty-one variables is reduced. For this purpose, year-end closing yields on publicly traded bonds are regressed on the rank number values of the twenty-one variables, for the companies for which bond yields are available. Regression coefficients and t-statistics are calculated for each variable, and only the significant variables are retained. Spivack showed a list of eleven variables retained in a recent run of the model.

A new regression is then run using this smaller number of variables, and new coefficients are obtained. The regression equation is applied to all the Value Line nonfinancial companies. A weighted score is calculated for each company, and the score is normalized. The stocks are then ranked according to their weighted scores and divided into nine equal groups, corresponding to the nine financial strength ranks. Some minor adjustments are made to these financial strength ranks, and the computerized part of the process is over.

The results of the computer analysis are evaluated by analysts and their editors. This provides for a judgment review of what the computer model has produced. On the basis of this judgment, some changes in the strength rankings may be made.

Spivack stressed three differences between the Value Line Model and the ZETA Model. First, the ZETA Model utilizes financial variables to discriminate between companies that are likely to go bankrupt and those that are not. The Value Line Model is based on market data, in the form of bond yields. Second, the ZETA Model is entirely objective, while the Value Line Model has a subjective element in the review by the analysts and editors. Third, there are some important differences in the choice of variables to be included in the two models. In general, the Value Line Model draws more on stock market variables.

Altman continued the presentation, referring to some statistical comparisons of the two models. The rank correlation between the Value Line scores and the ZETA scores was quite high, at 0.857. The correlation between the Value Line ranking and Standard & Poor's bond ratings was even higher, at 0.867. The correlation between the bond ratings and ZETA scores was a little lower, at 0.854.

What was of particular interest, Altman observed, was that the analysts and editors had modified the Value Line financial strength ratings in thirty-three cases, and in thirty of these cases the ZETA scores suggested modification in the same direction.

REAL ESTATE INVESTMENTS

38. PANEL DISCUSSION: SECURITIZATION OF REAL ESTATE (Fall, 1985)

Sandy Apgar, President, Wellington Real Estate, introduced the panel and the topic. He began by defining securitization as the monetizing, or making more liquid, of real estate assets. The biggest challenge in financing real estate is the reconciliation of the demand by investors for liquidity, with the inherent illiquidity of real estate. To give some perspective on the magnitude of the real estate business, and the relative growth of the debt and equity components of real estate financing, he showed a number of tables. Wellington has concluded that real estate should make up perhaps 20 percent of a long-term investment portfolio. (More specifically, their choices would be 5 percent in a disinflationary environment, 20 percent in a moderate growth economy, and 30 percent in an economy with accelerated growth.)

J. Steven Manolis, a Salomon Brothers Director, continued the discussion with particular emphasis on the shift that is taking place in the financing of real estate, from a clearly segmented real estate market to the regular capital and securities markets. The benefits to the owner of real estate who is seeking financing lie in the lower costs that may be available in the regular capital and securities markets, as well as the appeal of dealing with a multitude of suppliers of capital rather than having to negotiate with a powerful single lender.

Part of the attraction of securitization lies in the possibility of creating a variety of obligations on a single property to suit the preferences of a variety of investors. But this switch from a single strong lender to a variety of investors creates a need for someone to represent the interests of the investors in establishing a structure for the financing and in performing the due diligence investigation. This responsibility will normally fall on an investment banker or market maker.

A substantial opportunity for lowered financing costs appears to lie in the securitization of real estate debt. At present, insurance companies are able to sell guaranteed investment certificates at a Baa yield, currently about 160 basis points above the Treasury curve, while investing the proceeds in real estate debt meeting an Aa standard. Securitization offers the prospect that the high-quality real estate debt itself might be offered directly to investors at a lower yield. It is not easy, however, to sell nonrecourse unrated debt without the guarantee of a financial institution. This is not the kind of debt that is familiar to most managers of fixed income portfolios, so they are inclined to shy away. At the same time, managers of real estate equity portfolios who are accustomed to analyzing real estate are not much interested in debt instruments.

Phillip E. Stephens, Senior Vice President, EQK Partners, distributed a copy of his presentation, entitled "Will Securitization Help Commercial Real Estate?"

He discussed the REIT offered to the public in 1985 by EQK. This offering was unusual in that 90 percent of it was placed with institutions, including pension plans, endowment funds, life insurance companies, bank trust departments, and money management firms. Stephens went on to identify the reasons for the unique institutional popularity of the EQK offering. REITs are attractive to investors because of their liquidity, and the EQK REIT shares are listed on the New York Stock Exchange. At the same time, however, shares in most REITs frequently trade at a significant discount from the value of the real estate assets. In order to reduce this discount, the EQK trust is organized as a closed-end fund with a finite life of eight to twelve years during which time the real estate will be sold.

Stephens went on to discuss other recent innovations in REIT offerings. Prudential has put together a REIT with both income shares and capital shares, which makes it possible to place the income with tax-exempt investors, particularly IRA or Keogh investors, and capital gains with taxpaying investors.

Thomas Lavin, Vice President, First Boston Real Estate and Development Corp., discussed the Euromarket for United States real estate instruments. He began with a quick review of the growth of the Euromarket generally, and the characteristics of that market that differ from those of the United States debt market. The Euromarket is very name-conscious, and it was this characteristic that made possible a bond offering by the Rockefeller group at an interest cost below the United States Treasury yield. The Euromarket also puts a premium on simplicity, which makes it particularly difficult to devise a real estate financing instrument that will do well there.

There have been three waves of United States real estate debt financing in the Euromarket. The first consisted of bonds offered by financial institutions, collateralized with mortgages and guaranteed by government agencies. The second wave, in late 1984 and early 1985, involved collateralized mortgage obligations, rated AAA and guaranteed by the major financial institutions issuing them. The third wave, represented by the financing of the world headquarters of American Express, took the form of fifteen-year zero-coupon instruments secured by a first mortgage but with no recourse. Ostensibly then, this third wave moved all the way to investor reliance on nothing more than real estate as security. Stephens commented, however, that a number of investors were probably relying on the credit standing of American Express itself, even in the absence of a specific guarantee.

In closing, he identified four factors that will determine the increased availability of the Euromarket for real estate financing. First is the development of appropriate rating criteria for the instruments to be offered. The second has to do with timing. A substantial amount of real estate paper is on the shelf awaiting lower rates. Third is the level of the United States dollar. And fourth, the absence of disclosure and registration requirements in the Euromarket make that market very attractive to private owners of real estate.

Carl Kane, Partner, Kenneth Leventhal & Co., discussed rating of commercial real estate obligations. The purpose of ratings is to establish a measure of absolute risk to the investor, a measure of the likelihood of full and timely payment of principal and interest. So far, Standard & Poor's has revealed its rating process for seasoned office properties. The firm will go on to rate multi-family properties and then retail and industrial properties.

A number of factors make the rating of real estate securities particularly difficult. The procedure followed by S&P is to evaluate the cash flow quality of each property securing a financial instrument in order to establish the worst-case cash flow. These worst cases are then modified to arrive at a worst-case debt service coverage for the instrument. Finally, the significance of guarantees is considered to establish a rating. Kane's opinion was that developers would be slow to move to the use of rated financial instruments. So long as they can get relatively cheap long- and short-term debt financing, they have little reason to give up conventional sources. But when cheap long-term financing is not readily available, developers will either have to give up an equity interest or turn to rated debt instruments.

David Clossey, Senior Partner, Trammell Crow Company, presented the developer point of view. Trammell Crow is one of the largest real estate development companies in the United States, privately owned by its hundred partners. Operations are decentralized among fifty-seven offices, where development partners find parcels of land, develop concepts, obtain financing, and construct, lease, and operate buildings. The activity that adds value is essentially the leasing and management. Financing is a necessary evil; project financing is the rule with no cross-collateralizing. The partner in charge of the particular development normally arranges the financing locally.

The traditional pattern is changing somewhat, largely because 100 percent debt financing is no longer readily available from traditional sources. A switch to securitization, however, represents a radical change for the development partners of Trammel Crow, and there is great reluctance to make that change. More specifically, the development partner sees five needs for financing: to acquire land, to construct, to replace construction financing with permanent financing, to dispose of property, and to acquire buildings and companies. Clossey observed that securitization may be appropriate (1) for the construction stage, where commercial paper may replace a bank loan; (2) for the permanent financing to replace the short-term financing; and (3) for the acquisition of buildings and companies.

In closing, Clossey stressed that securitization of real estate financing calls for radical changes in the thinking of real estate developers. It involves high initial costs not found in more conventional real estate financing. And securitization does not fit well with the traditional real estate culture. Expanding on this last point, he observed that the financial community is not comfortable with real estate as an investment. Real estate development is an entrepreneurial activity; each property is unique; very high leverage is common; the real estate industry is characterized by boom and bust; taxes are very significant in real estate investment; there is a great lack of historical data on real estate returns; and there are no very good valuation tools for dealing with the long-term real estate asset values. The process of securitization has begun, but it is a painful one, and it will take time before real estate developers enjoy its benefits.

Blake Eagle, Senior Vice President of Real Estate, Frank Russell Company, dealt with pension fund attitudes toward securitization of real estate.

He began by pointing out that in one form or another securitization has a long history in the real estate world. In explaining the reasons for securitization he observed that there is a substantial need for real estate capital, that raising the capital in the regular securities and capital markets may lead to reduced cost (as Manolis had pointed out earlier), that expertise in tapping the regular capital markets for real estate financing was developing on Wall Street, and that REITs offered attractive opportunities for the investment of retirement funds in real estate.

Eagle also offered some comments on the FRC (Frank Russell Company) property index. He had discussed this subject at the Q Group Seminar in the Fall of 1981, and was now able to report the formation of the National Council of Real Estate Investment Fiduciaries, with a membership of about thirty institutions managing almost $100 billion of real estate assets. These members are willing to pool information on real estate values, so that the FRC index now includes over 900 properties, with a value of nearly $9 billion. Frank Russell is also developing an index for participating mortgages.

A number of participants raised questions about the future of REITs and the current supply/demand situation for real estate. Stephens observed that there are about fifty REITs in registration at the present time, most directed individual investors. Manolis commented on the negative connotations of REITs for institutions, stemming from the poor performance of the industry in the 1960s and 1970s. He thinks that on the equity side securitization will proceed slowly, but that it will proceed faster on the debt side, because benefits to the issuer are more substantial. Eagle referred to massive overbuilding in some parts of the country, and in his opinion there will be a retrenchment in pension investments in real estate.

SECURITIES FIRMS

39. PANEL: COMPETITIVE STRATEGY AND IMPLICATIONS FOR INVESTMENT ANALYSIS
(Spring, 1983)

This panel discussion followed a series of presentations on competitive strategy (see presentations Nos. 47, 48 and 49). James M. Scott, Professor, Graduate School of Business, Columbia University, moderated a panel made up of himself, A. Michael Spence, Professor of Business Administration, Harvard University; David M. Kreps, Professor of Decision Sciences, Stanford University; John W. English, Vice President and Chief Investment Officer, the Ford Foundation; William L. Fouse, Senior Vice President, Wells Fargo Bank; Arthur Williams, III, Vice President-Pension Fund Investments; Merrill Lynch, Pierce, Fenner & Smith; and Jack L. Treynor, Executive Vice President, Treynor-Arbit Associates. The subject was the competitive structure of the investment management business.

Spence led off by establishing a number of questions that had to be answered before the competitive structure of the business could be understood. First, he wanted to know exactly what investment managers are selling, that is, what the customers believe they are buying. Next he wanted to know who are the participants in the business, and whether they can be categorized. A critical question would be what basis there may be for product differentiation. Another is what are the barriers to entry, and who are the potential entrants. Finally, buyers of investment management services seem relatively insensitive to price, and Spence wanted to know why.

The industry members of the panel, and a number of other participants, contributed answers to these questions. Some described the industry product as rate of return on invested assets. Others saw it as assurance that ERISA requirements would be met. A number felt the product is very difficult to describe precisely, and others added that it is particularly difficult for a client to evaluate what an investment manager has done for it. Managers work hard to establish product differentiation, and clients appear to see managers as highly differentiated. All this helps to explain why clients are generally insensitive to price.

Kreps raised questions about the cost structure of the industry. The marginal cost per client added appeared to be low. It is very much a function of the number of accounts an individual manager can handle.

Overall, the characteristics of the investment management business appeared to fit rather neatly into the analytical framework Michael Porter and Kreps had suggested in preceding sessions (presentations Nos. 47 and 48), and explained why firms in this industry are very profitable and are likely to remain so.

SECURITIES MARKETS CHARACTERISTICS

40. FINANCIAL MARKETS: A PERIOD OF CHANGE (Spring, 1984)

John C. Bogle, Chairman, the Vanguard Group, opened the Spring, 1984, Seminar with the observation that he had a new title for his talk: Statistics and Suicide. He described himself as a firm believer in the usefulness of quantitative methods in investment management. He observed that sometimes quantitative concepts (duration is one example) pass unchanged from academic theory into practical use. And at other times the quantitative concept is very much modified before it can be implemented in practical investment management; an example here would be the capital asset pricing model.

The Vanguard organization has used many quantitative innovations. For example, the Vanguard Index Trust was the first, and remains the only, mutual fund operated purely as an index fund. Its performance shows a correlation of 0.99 with the Standard & Poor's 500 Index. The Trustees' Commingled Fund is operated in accordance with an efficient market hypothesis. The small-firm effect, reported in a number of academic papers, has been exploited by Vanguard. And an international fund is based upon quantitative research that established the diversification and risk reduction advantages, with no sacrifice in rate of return, that can be found in international portfolios.

Bogle stressed that it is a combination of quantitative methods and sound judgment that leads to superior performance, and he provided three examples of that combination. First, the Windsor Fund, and the Trustees' Commingled Fund, make an interesting pair, because the former is characterized by a management style that focuses on individual stock selection, while the latter reflects a style that consists of establishing a strategy and then allowing a computer to pick the stocks to match the strategy. He commented that the strategies of the two managers are very simple, and the performances of the two funds, reflected in their rates of return, their standard deviations of return, and their betas, have been very similar.

His second example concerned costs of investment management. Investors in high-cost funds can certainly expect to earn less than investors in low-cost funds. And for many funds, costs are rising. While in the past expense ratios of 0.50 to 0.75 percent were common, one can now find ratios in the range of 1.5 percent to 2 percent. Annual expenses on this order are bound to significantly depress investment results for fund shareholders.

He observed that the high turnover caused by substantial switching among funds is having a major impact on management costs. The volume of switching has increased recently, as a number of advisory services have emerged, dedicated to offering timing advice to fund shareholders.

His third example was the procedure for performance analysis at Vanguard, where the outside managers of thirty-two funds are regularly judged in the process of hiring, retaining, and firing managers. For each fund, the cumulative total return for a three- to five-year period is the basic measure of performance. The performance is compared with those of six other mutual funds considered to constitute a comparable peer group. Comparability is established using beta coefficients, R squared, and yield. A second comparison is against the performance of the group of all mutual funds with similar objectives. And a third comparison is with an appropriate market index. On the basis of the comparisons, a fund manager is rated as average, above average, or below average. Above-average and below-average performance represents performance that is more than one standard deviation from the mean performance.

With respect to beta coefficients, Bogle observed that he has little use for cross-sectional betas, but he does use *ex post* portfolio betas to determine whether a fund is deviating from an appropriate range of market risk. He finds no value in alpha coefficients.

After commenting that managers are not hired and fired purely on the basis of the three- to five-year performance comparison, he reported an experiment on performance rankings of eighty-seven funds, for which twenty years of performance data are available. The correlation between the performance rankings for the decade 1964 through 1973 with the rankings for the succeeding decade, 1974 through 1983, was almost zero. His conclusion was that no matter how refined the quantitative measure of performance, it is still lacking in predictive value.

In closing, Bogle observed that quantitative analysis has added a new and valuable practical dimension to investment analysis. Its value, however, is found only in conjunction with good judgment. To forget this, to become obsessed with quantitative measurements, and finally to conclude that what cannot be measured does not exist, is indeed suicide.

SOUTH AFRICA

41. SOUTH AFRICA AND THE SULLIVAN PRINCIPLES (Fall, 1985)

D. Reid Weedon, Jr., Senior Vice President, Arthur D. Little, Inc., discussed the monitoring of the United States corporations doing business in South Africa that have subscribed to the Sullivan Principles. He described the situation in South Africa and why this country has become the focus of so much concern with respect to investment by United States institutions.

Since 1978, when Leon Sullivan first asked Arthur D. Little to review the questionnaire responses from Sullivan Principle signatories, this review process has become considerably more complicated. Not only has the list of companies subscribing to the principles grown, but the Sullivan Code itself has been extended, with the fourth amplification put into effect in December 1984. This last amplification calls on the signatories to speak out and take action against apartheid in South Africa.

The task for A.D. Little is to score the questionnaire responses indicating what the companies are doing to live up to the Sullivan Principles, and then to assign to each of the companies a grade: Pass, High Pass, or Fail. A.D. Little publishes an Annual Report (listed in a bibliography provided by Weedon and reproduced at the end of this Summary) on its work. The questionnaire evaluation is important. It is one thing for a corporation to subscribe to the Sullivan Principles and quite another for it to undergo an evaluation of its efforts to implement those principles.

In explaining why there has been so much concern with apartheid in South Africa, when there are much more extreme examples of racial oppression and atrocities in other African nations, Weedon pointed out that it is much easier to get information on activities in South Africa than in other African nations, and that in the United States we tend to judge South Africa on the basis of what we perceive to be appropriate behavior in the western world, which may differ somewhat from the way in which we evaluate activities in other African countries.

Turning to important characteristics of South Africa, Weedon pointed out that the black population of that country, while substantial (approximately 23 million of a 34 million total) is far from homogeneous. There are substantial enmities among the ten tribes of black South Africans, to say nothing of antagonisms affecting the many South Africans who are neither white nor black. What this means is that for many blacks the prospect of black majority rule in South Africa may not be much more attractive than white majority rule.

South Africa exports annually about $18 billion worth of goods, and imports about $14 billion worth. Exports are mostly in the form of raw material, including gold, platinum, chromium, and vanadium. Imports are mostly in the form of manufactured goods. South Africa has not recovered from recession as has most of the world. There is still about 50 percent unemployment for blacks. Inflation is currently at about 16 percent a year, the rand has dropped to about one third of what it was worth in United States dollars three years ago, and the last two and a half years of drought have had a serious effect on South African agriculture.

In recent months, black South Africans have been given reason for both hope and despair. Positive legal developments include recognition for black unions, legalization of mixed marriages, admission of blacks to apprenticeship programs, and easier access to metropolitan areas. At the same time, the government has raised rents in black townships and has recently extended the income tax to affect many black people. Weedon pointed out that in assessing the attitude of the white majority in South Africa it is important to realize that these whites have no other place to go. Rhodesians, confronted some years ago with demands for black majority rule, were able to move to South Africa. But there is no nation to which South Africans can comfortably move.

On the basis of the demographics and the economy of South Africa, and the power and motivation of the governing white minority, Weedon concluded that the best that can be hoped for is continuation of the minority rule with steady improvement in the condition of blacks. United States corporations doing business in South Africa can help to bring about this improvement.

South African Bibliography October 13, 1985

Ninth Report on the Signatory Companies to the Sullivan Principles – ICEOP, 1501 N. Broad St., Philadelphia, Pa. 19112. $15

Directory of US Companies in South Africa – IRRC, 1319 F St., NW, Washington, DC 20004. $100

Disinvestment – National Legal Center for the Public Interest, 1107 17th St., NW, Washington, DC 20036. $5

Waiting: The Whites of South Africa- V. Crapanzano

An Instant in the Wind- Andre Bank

Blood River- Barbara Villet

Too Late the Phalarope- Alan Paton

Cry the Beloved Country- Alan Paton

42. PANEL DISCUSSION: FINANCIAL IMPLICATIONS OF SOUTH AFRICA DIVESTITURE POLICIES (Fall, 1985)

Allen R. Faurot, Director of Special Investments with the Ford Foundation, moderated a panel of four participants. He made it clear that the purpose of the panel was to discuss only the financial and investment implications of divestiture. Reid Weedon had dealt with the more general issue of conditions in South Africa (presentation No. 41).

Wayne Wagner, Chief Investment Officer, Wilshire Associates, distributed a reprint of his article in the *Financial Analysts Journal* of November/December 1984 entitled "South African Divestment: The Investment Issues."

Striking a note that was picked up by other participants on the panel, Wagner observed that the divestment issue is forcing investment managers to think differently about their work. He organized his presentation around three questions: What investment problems are presented by a restriction against stocks of companies doing business in South Africa? Are these restrictions actually binding on the manager? And if they are, how do they affect rates of return? His conclusion was that full restrictions, that is an absolute prohibition against holding stocks of companies doing business in South Africa, are likely to be binding, especially on large portfolios. And they will call for substantial change not only in the portfolio holdings but in the process by which portfolios are assembled. A less restrictive rule, on the other hand, such as a prohibition only against companies not subscribing to the Sullivan Principles, presents no serious problems to an investment manager.

Wagner turned next to some specific consequences of eliminating from a portfolio all companies doing business in South Africa. He had relied on the list prepared by the Investor Responsibility Research Center (IRRC), while observing that there are other lists of "prohibited" companies. The IRRC list identifies 152 "prohibited" companies on the S&P 500 Index, companies representing about 52 percent of the capitalization value of the index. What is more important is that the companies are concentrated in certain industries. For example, they represent 99 percent of the industrial equipment stocks in the S&P 500.

Once this list of substantial companies is eliminated from a portfolio, the next question concerns replacement. Wagner's analysis called for replacing each eliminated company by the largest company in the same industry not already in the S&P 500 Index. So he created a new 500-company universe, with the same number of stocks in each industry as in the original S&P 500 index. The weightings were of course considerably different. He tracked the performance of this new universe for ten years through 1984. The new universe produced a return of 15.9 percent per year, while the S&P 500 return was only 14.7 percent. The difference in return reflects the emphasis on smaller companies in the new universe, and was accompanied by some loss in diversification and some increase in exposure to market risk. A comparison of the S&P 500 and the new universe on the basis of Value Line Timeliness and Quality Ratings indicated not much difference in timeliness but a significant reduction in quality in moving from the S&P Index to the new universe.

Wagner's analysis also included an estimate of the cost of shifting from the S&P 500 to the new universe. The total cost of elimination and replacement was estimated at 1.8 percent to 6.0 percent, depending on the size of the position traded. Finally, Wagner presented some statistics indicating for various management styles the probable tracking error, beta, and nonmarket risk for South Africa-free portfolios. The management styles most affected would be passive core, active core, defensive, and rotator. Styles emphasizing smaller companies would be affected very little.

Turning to fixed-income divesting, he commented that within the corporate sector divestment would require a sacrifice of quality. However, one could always shift from corporates to governments. Cash managers would be affected because divestment would substantially reduce commercial paper availability.

In conclusion, Wagner commented that divestment may force pension plans into higher-risk portfolios. Whether this is harmful will depend upon the demographics of the pension plan and whether it is already positioned at an appropriate risk level. His belief was that divestment does run counter to the traditional fiduciary responsibility to the beneficiaries of a pension plan, and raised the question of what would be the ultimate consequence of abandonment of the prudent man rule over the divestiture issue.

Stanford Calderwood, President, Trinity Investment Management Corp., drew on his experience managing approximately $180 million of South Africa-free funds. He organized his presentation under two questions: Should a fund adopt a divestiture policy? And if the decision is yes, then how should the fund be managed? On the first question, many of his conclusions on the disadvantages of divestiture were similar to those of Wayne Wagner.

He focused especially on liquidity cost. The S&P 500 companies that would be excluded from a portfolio represent about half of the capitalization value of the index. Inevitably, the portfolio would have to move toward smaller stocks that are harder to trade. Perhaps even more important, few managers want to work under divestiture rules. For a manager relying on research done by analysts, some very serious problems are presented if the customarily followed stocks must be dropped and attention must be switched to a new list of more obscure stocks. So far, Calderwood said, the game has been fairly easy. Relatively few portfolios are subject to a South Africa- free policy, and these are mostly small portfolios. But the situation will change if many large portfolios move toward divestiture.

Turning to his second question, Calderwood described what Trinity has done. Trinity's basic strategy, free of any limits on companies doing business in South Africa, makes use of a universe of 369 stocks, with an average market capitalization of $3.5 billion. Its South Africa-free universe consists of 436 stocks with an average market capitalization of $1.8 billion. The average daily trading for stocks in the South Africa-free universe is about half that of the stocks in the basic universe. Calderwood believes that Trinity can invest a total of about $150 million in stocks not in its basic universe that must be included in the South Africa-free universe. Individual holdings are kept to not more than 30 percent of one month's trading and not more than 2 percent of market capitalization.

Robert B. Zevin, Economist and Vice President, United States Trust Company of Boston, presented a somewhat different view, arguing that divestiture of companies doing business in South Africa is much less limiting than Wagner and Calderwood had suggested. He believes it is possible to construct an acceptable index fund, with a very low tracking error when compared to the S&P 500 Index. A manager can under- or overweight any characteristic of a South Africa-free portfolio, relative to the weighting in the S&P 500 Index, except exposure to size. He agreed with other speakers that an emphasis on small capitalization stocks has paid off in recent years and explains why South Africa-free portfolios have established good performance records.

Zevin's sharpest criticism of the arguments against divestiture had to do with transactions costs. He had a number of reasons for disagreeing with Wagner's reliance on transactions cost data prepared by Thomas Loeb in estimating what it would cost to carry out a divestiture program. He also argued against Wagner's substitution formula by which each stock eliminated was replaced by a new stock not on the S&P 500 Index. He argued that this strategy depends on industry codes as the key to diversification. U.S. Trust Company has worked with a universe of 348 non-South African stocks that has tracked the S&P 500 Index more closely than Wagner's South Africa-free universe.

Andrew Rudd, Managing Director, BARRA, referred to a series of papers and research undertakings by BARRA on the subject of South Africa divestiture. Like Wagner, Rudd stressed that the divestiture issue poses to a plan sponsor more than just the question of how one should make portfolio substitutions to bring about a new portfolio with the same essential characteristics as the old. It may be more appropriate to think through whether the new portfolio should have the same characteristics as the old. If one insists on developing a universe that matches as closely as possible the Standard & Poor's 500 Index, then one is likely to encounter maximum costs.

There have been a great many studies of the impact of divestiture on portfolio performance. Typically these studies begin with the S&P 500 Index as a universe, and move toward an index fund that excludes companies doing business in South Africa. The result is usually to add about 2 percent to the residual standard deviation, but the cost due to this residual risk is generally no more than a few basis points. The cost of making the shift itself usually is estimated on the basis of rather high trading costs. Rudd's comment was that this shift is an informationless trade, and that the cost should be very small.

With respect to the ongoing performance of a South Africa-free portfolio, work done by BARRA indicates that exposure to foreign income is the most important factor in active management. In general, this exposure has had a negative impact for many years, so South Africa-free portfolios, which generally have very low exposure to foreign income, have outperformed other portfolios. The second most important factor is size, and here of course by its nature the South Africa-free portfolio is forced toward smaller capitalization stocks.

Rudd reported the results of a five-year simulation of a portfolio consisting of the S&P 500 Index after the elimination of stocks on the IRRC list of companies doing business in South Africa. The portfolio under-performed the S&P 500 Index by about eighty basis points per year. The portfolio was constructed to match the S&P 500 Index on all factors except specific risk and return. It was this specific risk that accounted for the eighty basis point differential.

Overall, his conclusion was that divestiture does not present a major problem except in the case of a very large fund. But he did believe there are some other significant issues raised by divestiture. One is the impact on security prices. He went through an analysis of what might happen as divestors sell stocks of companies doing business in South Africa, and accommodators buy those stocks. In the most extreme case, prices would have to adjust by about 11.6 percent. That is, the prices of the companies doing business in South Africa would have to fall relative to the prices of other stocks by 11.6 percent. A more realistic assessment of what might actually happen led him to a 2 percent change, and he left open the question whether the adjustment may already have taken place.

James Scott, Jr., Professor of Finance, Columbia School of Business, summarized the issues that had been raised. Like some of the panel participants, he suggested that while it is easy to focus on the cost of divestiture it may be more appropriate to focus on the investment strategy, that is appropriate following divestiture. The strategy choice will have a good deal to do with the cost of divestiture. For example, moving to a computer-based management style as at Trinity Investment Management avoids any new research costs necessary to follow new stocks.

An interesting question had been raised by Wagner in terms of how an institution should go about divesting stocks of companies doing business in South Africa. If the objective is to make a public display, then the cost may be somewhat higher than it would be in a more gradual program.

Scott also raised the question whether mimicking the S&P 500 is an appropriate way to design a universe that is South Africa-free. And he suggested that the use of foreign stocks might reduce the problems many saw in a South Africa-free portfolio.

STOCK PORTFOLIO MODELS and ASSET ALLOCATION

43. THE MULTIPLE ASSET INVESTMENT SETTING (Spring, 1985)

Gary P. Brinson, President, and Jeffrey J. Diermeier, Managing Director, First Chicago Investment Advisors, distributed a paper entitled "The Multiple Asset Investment Setting."

Brinson began with a display of average rates of return and standard deviations for the fifteen years 1970 through 1984 for eight classes of investment assets and for the SEI median balanced pension fund manager. The median fund manager had underperformed each of the eight asset classes, and Brinson undertook to try to explain this poor record.

He suggested a series of questions that might lead to an explanation. The first concerned which classes of assets were included in pension funds and which classes were excluded. A closely related question concerned the normal weights attached to the various classes by pension funds, and how those weights were shifted over the fifteen-year period. Working with any particular class of assets, an active manager may be able to deliver a return above the average for that class, but it turns out that the value added is much less important to the performance of the fund than the choice of asset classes to be used and the weightings chosen for the selected classes.

Brinson illustrated this conclusion by an analysis of the variance of total plan sponsor portfolios. His data showed that actual security selection and actual shifts among asset classes by the managers of ninety-one large funds over the decade ending in 1983 had very little effect on the average rates of return for the funds. Those returns were dominated by two elements: the performances of the markets for the various asset classes, and the *average* allocation of each fund among those classes. The first of these elements is of course beyond the control of any sponsor or manager. Only the second is controllable.

The source, then, of most of the underperformance of the pension funds must lie in their average allocation among asset classes. These allocations might be compared to the market weights of all asset classes, either world-wide or within the United States. Brinson presented charts showing the components of the investable worldwide capital market and the investable United States capital market. To allow for an appropriate choice of risk level, Brinson turned to the Multiple Markets Index, constructed by First Chicago, an index that makes use of weights that produce a risk profile similar to the risk profile for the typical pension plan. He next compared performance results showing that the average asset allocation for the funds actually would have produced a rate of return superior to those for the world and United States capital markets, although inferior to that for the Multiple Markets Index. But on a risk-adjusted basis, the results would have been worse than those for either of the two markets. The active timing and security selection decisions made by the managers of the funds actually pulled the rates of return down below those for the world and United States markets. More specifically, the active timing cost about sixty-seven basis points per year, while active selection cost another thirty-six basis points.

Diermeier discussed the development of the policy portfolio, the set of classes and weights making up the normal long-run portfolio for a pension plan. The decision begins with a set of suitability criteria to be used in selecting the asset classes for the plan. Next, the normal weights must be chosen, and the paper describes three separate approaches for establishing these weights. Diermeier described the third of these methods, mean-variance portfolio optimization. Expected rates of return for the asset classes were determined by separately estimating a risk-free real rate of return, an inflation premium, and a risk premium, and adding the three. Only the risk premiums differentiate among asset classes. There are two ways to arrive at risk premiums. The first assumes perfectly segmented markets and denies the benefits of diversification. The second assumes perfectly integrated markets, takes account of the ability to diversify a portfolio across all asset classes, and therefore attributes lower risk premiums to asset classes that offer significant diversification possibilities. Diermeier presented tables showing sample risk premiums for both the segmented and integrated assumptions.

Brinson returned to point out the very substantial benefits that might be achieved from successful strategic modification of the asset class weights. He went on, however, to identify a number of conditions that should be met before a plan sponsor undertakes strategic asset allocation. Perhaps the most important of these has to do with evaluation of performance results. The sponsor must be prepared to deal with the extraordinary difficulty involved in assessing the success of a manager is market timing. Brinson presented simulation results showing that a skillful strategic asset allocator, guaranteed to deliver a long-run superior performance, may still produce several successive years of below-average performance.

44. PRODUCT MARKETS AND INVESTMENT VALUE CREATION (Spring, 1985)

Max Maksimovic, Department of Economics, Harvard University, presented an industrial organization view of company valuation, and drew a number of parallels between models applied by security analysts to financial markets and models that economists are attempting to apply to the markets for real assets.

He described his ultimate goal as the development of a model for valuing real assets equivalent to the Capital Asset Pricing Model for valuing financial assets and portfolios of financial assets.

He identified the steps we usually follow in building a financial model, and turned to the steps one might try to follow in building a model for valuing real assets. Industrial organization theory suggests a number of factors bearing on the likely profitability of a company in an industry characterized by some degree of competition. The intensity of rivalry among companies already in the industry is important, and Maksimovic discussed a number of characteristics that would aid in a determination of the level of this intensity. The threat of entry by new competitors is also important; here Maksimovic identified the considerations that might lead to a conclusion as to the ease of entry and hence dissipation of profits. The power of suppliers to the industry and the power of buyers from the industry are also factors, as is the threat of substitute products from companies not in the industry.

From these considerations affecting likely profitability, Maksimovic turned to a brief discussion of three generic strategies for dealing with competition: establishing overall cost leadership, establishing product differentiation, and establishing a focused combination of cost leadership and differentiation. He considered the skill and resource requirements for each strategy and the organizational requirements. It is important to note that organizational requirements can be difficult to manage. The culture of the organization may make it impossible for a company to undertake a strategy that is clearly the correct one to preserve or increase profits.

Applying the structural analysis that Maksimovic had established requires identification of the elements of market structure, a determination of how different strategies affect competitive outcomes, and evaluation of each strategy. A good deal of empirical research has been done on product market imperfections. This research is somewhat analogous to research that has sought to find imperfections in the financial markets. In both real asset and financial asset markets, fundamental analysis can pay off only if there are imperfections to be exploited. Maksimovic identified a number of empirical findings: Profits are correlated with market share. Increasing market share is generally expensive. Managerial excellence cannot generally be identified as a source of profit. Unions tend to appropriate profits, so that in a heavily unionized industry the benefits of an attractive market structure are likely to flow to employees rather than to investors.

Unfortunately, there is no general theory of valuation in real markets to which to apply empirical tests. Instead of attempting to construct a general model, analysts have contented themselves generally with working out solutions to rather narrow problems confronting specific companies in specific industries. As an example, Maksimovic demonstrated how one might go about establishing the likelihood that a competitor would enter a specific industry and reduce the profitability of all companies in that industry.

He concluded with a discussion of three possible ways to apply industrial organization to company valuation. One is to work out which are the critical factors for profitability in a particular industry, and then use a decision tree or a set of different scenarios, with probabilities, to arrive at an expected value. Another is to work with statistical resources, such as the Compustat data, and apply a series of screens to identify value. What one would like to do is develop computer programs that would incorporate cost factors and risks and deliver values for companies. At present this particular method of application appears too difficult. Yet, Maksimovic believes this approach to be the most promising, indicating that it probably is at the same stage of development as portfolio theory was ten to fifteen years ago.

45. PORTFOLIO THEORY AND DISCRETE DATA (Fall, 1984)

Edwin J. Elton and Martin J. Gruber, Professors of Finance, Graduate School of Business Administration, New York University, presented a paper entitled "Portfolio Analysis with Partial Information: The Case of Grouped Data."

Elton began by describing the general problem. In most cases those making up portfolios of securities are dealing with simplified information about the universe of stocks available for investment. For example, one may be dealing with expected returns for the stocks, or with expected returns and variances, or with expected returns and variances and beta coefficients. In any case, information on the individual stocks has been condensed to a few summary statistics. The particular case to be addressed in this presentation involves the availability of discrete rankings with securities formed into groups. A typical group pattern might be best buys, buys, holds, sells, and definite sells. The problem is how one forms portfolios when the information comes in this way.

There are at least eight ways in which stocks may be grouped. The most common criterion appears to be expected return. All securities in a group are treated as if they had the same expected return. But there are four different sets of assumptions that may accompany use of the expected return criterion. First, it may be assumed that the variances of all stocks are the same and that the covariances between the returns on all pairs of stocks are the same. Second, it may be assumed that the covariances are all the same, but that the stocks in any one group may have different variances from the stocks in any other group. Third, it may be assumed that variances of stocks differ between groups, but that the correlation, rather than the covariance between the returns on all pairs of securities, is the same. Finally, it may be assumed that within each group the stocks all have the same beta and residual variance, although beta and residual variance may differ from group to group.

The second major criterion used for ranking is risk-adjusted expected return, and there are two ways in which the criterion may be expressed. One is the ratio of expected excess return over a risk-free rate to beta, and the other is expected excess return over a risk-free rate to standard deviation. The third major ranking criterion used is deviation from the security market line. In other words, the expected return is compared to the normal market expected return at the same beta, and the difference–the so-called alpha–is the ranking criterion.

Using this criterion, three sets of assumptions are possible. First, it may be assumed that the alpha is the only known characteristic of a stock, and that the beta and the variance is the same for all stocks and the covariance between the returns on all pairs of stocks is the same. With this assumption made, the case is exactly the same as the first one discussed under the expected return criterion. So only the second and third assumptions are of interest. The second assumption is that not only is the alpha for each stock known, but there is a different beta for each group of stocks. Residual risk and the covariance between residuals is assumed to be the same for all stocks. Finally, the third assumption is that the residuals are uncorrelated.

All in all, then, there are three major criteria for ranking and eight different ranking methods, employing all of the various assumptions that may accompany the criteria.

The Elton and Gruber analysis explored four important aspects of the process of forming an optimum portfolio for each of the eight methods. The four questions explored were:

1. Under what conditions is it optimal to select a group in its entirety before selecting members of a second group?
2. Once a group has been selected, what proportion should the stocks of that group represent in the portfolio?
3. If more than one group is selected, what proportion should the selected groups represent in the portfolio?
4. In forming groups of stocks, what criteria should be used?

The paper prepared by Elton and Gruber discussed in some detail each of these questions for each of the eight ranking methods. The oral presentation, however, included only the final results. These are summarized in the table below.

From the table one can see that for each of the eight cases groups are selected or rejected in entirety. That is, a portion of a group is never included in an optimal portfolio.

In four of the eight cases, groups are always selected in order. That is, the group ranking highest on the major criterion is selected before a group ranking lower. In four cases this rule is not necessarily followed. If the major criterion is expected return, but variances may differ from group to group, although correlations between returns on pairs of stocks are all the same, the better group is not necessarily the one with the highest expected return, but is the one with the highest expected excess return to standard deviation. Similarly, if the assumption is that the beta varies from group to group, the superior group is the one with the highest expected excess return to beta. If the major criterion is alpha, then we can be sure that groups will be selected in order of alpha only if the investor holds an investment in the market portfolio as well as in the optimal portfolio.

In six of eight cases, once a group has been chosen, the optimal portfolio will be invested equally in each stock of that group. The two exceptions to the rule occur when the major criterion is risk-adjusted expected return. As can be seen in the summary table, when the risk is beta, the proportions for the stocks are a function of the ratio of the beta to the residual risk, and where the risk measure is standard deviation, the proportions are a function of the reciprocal of standard deviation.

In only two cases is it likely that more than one group of stocks will be included in the optimal portfolio. If the major criterion is expected return, and it is assumed that all stocks have the same variance and that the covariance between the returns on all pairs of stocks is the same, then any group for which the expected return is greater than the risk-free rate will be included in the optimal portfolio. The same is true if the covariance between the returns on all pairs of stocks is assumed to be the same, but variance of stock returns is assumed to differ among groups.

Gruber concluded the presentation by describing projected empirical work using data supplied by Bankers Trust Company on estimates from thirty-three brokerage firms for over two thousand stocks.

PORTFOLIO THEORY AND DISCRETE DATA

EDWIN J. ELTON and MARTIN J. GRUBER

Group Criteria	Expected Return				Risk-Adjusted Expected Return			Alpha
					Beta and Residual Variance			
	Same Variance and Covariance	Variances Different Among Groups Same Covariances	Variances Different Among Groups Same Correlation	Same Within Group	$\frac{\bar{R}_i - R_f}{\text{Beta}_i}$	$\frac{R_i - R_f}{\text{Sigma}_i}$	Residuals Correlated	Residuals Uncorrelated
Groups Selected or Rejected in Entirety	yes	yes	yes	yes	yes	yes	yes	yes
Groups Selected in Order	yes	yes	Depends on $\frac{\bar{R}_i - R_f}{\text{Sigma}_i}$	Depends on $\frac{R_i - R_f}{\text{Beta}_i}$	yes	yes	Only if market portfolio also held	Only if market portfolio also held
Equal Amount Invested in Each Stock in Same Group	yes	yes	yes		no $X_i = \frac{\text{Beta}_i/\overset{\text{resid}}{\text{risk}}}{\sum \text{Beta}_i/\overset{\text{resid}}{\text{risk}}}$	no $X_i = \frac{1/\text{Sigma}_i}{\sum 1/\text{Sigma}_i}$	yes	yes
Group 2 Included if	$\bar{R}_2 > R_f$	$\bar{R}_2 > R_f$	Almost Never	Almost Never	Almost Never	Almost Never	possibly	possibly

46. ASSET ALLOCATION: A PRACTITIONER'S VIEW (Spring, 1984)

Edmund A. Mennis, consultant to investment management, distributed a paper entitled "Asset Allocation: A Practitioner's Viewpoint."

He began by distinguishing strategic from technical asset allocation. The first has to do with setting a fairly long run (five-year or so) allocation to reflect long-run objectives, risk tolerance, and long-run expectations with respect to asset categories. The second has to do with day-to-day adjustment to the market. He limited his remarks to the strategic allocation process.

He first discussed the setting of objectives, including choice of a time horizon. Plan sponsors rarely seem to have well-defined objectives. And while clients pay lip service to the principle that a three- to five-year time horizon is appropriate, they generally begin to look for results in a matter of months.

Mennis believes that in setting objectives a client should determine an absolute target rate of return. Clients tend to want to specify their objectives in terms of a rate of return relative to the performance of an index, or in terms of a particular quartile of manager performance.

Mennis is able to offer the clients some assistance in choosing the target rate of return. A computer program provides the values of four key variables, for a range of rates of return. Variables are annual plan contribution as a percent of payroll, the percent of vested liabilities that are funded, the percent of total liabilities that are funded, and the actuarial gains and losses as a percent of plan assets. The client can use the computed values for these variables to determine what rate of return target will be satisfactory.

The client must next specify a degree of risk tolerance. Mennis describes risk in terms of the probability of failing to achieve the absolute rate of return objective.

Next the client must select the asset types from which a portfolio is to be made up. Mennis generally begins with only three classes of assets: stocks, fixed income, and cash equivalents. For small- to medium-sized pension funds, three classes seem to be enough. For larger portfolios, other classes of assets can be compared one at a time against the three basic classes, to see whether they appear to offer advantages.

The first asset allocation model described by Mennis is a fairly complex one that is appropriate for the larger pension plans. The model requires specification of expected rates of return on the asset classes. One possible source of expected returns is a tabulation of historic returns, and here Mennis discussed the usefulness of the Ibbotson and Sinquefield data, as well as some of the problems presented in interpreting historical figures. Another possibility is to use economic forecasts, and perhaps test the model on three or four possible future scenarios. Mennis prefers to use risk premiums, working from the expected inflation rate to the return on a risk-free asset, and then to expected returns on bonds and stocks. This is an approach that clients apparently have found attractive.

Rather than dealing with the pension fund as a whole, Mennis has found it useful to partition the fund into three components. The first component serves to meet the contractual liabilities to retired employees. The second meets the vested liabilities to employees who will retire within the next ten years. And the third component meets all other liabilities (to vested employees with more than ten years to retirement, and contingent claims). The corporation can be thought of as funding the third category, which funds the second category, which funds the first category, which pays the pension benefits.

The first category will be the most conservatively invested. The client indeed may choose to fund this category in such a way that there is a 100 percent certainty of meeting the liabilities. Because the actuarial estimate of liabilities can be fairly certain in this case, funding with United States government securities can provide virtually 100 percent certainty of covering all liabilities. For a client who is willing to take some risk of underfunding in the expectation of achieving a higher rate of return than can be obtained on government securities, the computer model will indicate the tradeoff between declining certainty and rising expected rate of return.

Normally it will be appropriate to take somewhat more risk in the second category and still more risk in the third category. Some of the participants pointed out that partitioning the total fund into three components, and considering one by one the appropriate risk level for each component, may well lead to a very low overall risk for the fund, or what is therefore an unnecessarily conservative investment strategy. Mennis agreed with this, pointing out that in applying his methodology generally he dealt with clients whose investment strategies had previously been extremely conservative.

The set of inputs needed by the program making the allocations to the three categories includes an actuarial rate of return, the management estimate of the annual increase in employee compensation, the management estimate of the annual increase in the total pension payroll due to growth in the labor force, the expected returns on each of the asset categories, the expected variability for each of these returns, and the correlations among the returns. Mennis displayed sample input and output.

He next turned to a simple model that is appropriate for clients who are uncomfortable with the complex model and reluctant to participate in the asset allocation decision. In this case the client is asked to make a five-year inflation forecast. From the inflation forecast, Mennis will derive expected returns on bills, bonds and stocks, using risk premiums. For example, if the inflation rate is expected to be 5 percent, the expected rates of return will be 6 percent, 9 percent, and 14 percent respectively. The client now specifies a minimum acceptable target rate of return, and the allocation program produces tables showing (for various proportions invested in the three asset categories) the expected rates of return consistent with a high probability (say 90 percent, if this is achievable) of achieving the minimum return. The client will determine, from inspection of the tables, a satisfactory combination of expected rate of return and probability of achieving the minimum. The tables indicate the allocation weightings appropriate for the client preference.

47. COMPETITIVE STRATEGY AND MARKET STRUCTURE (Spring, 1983)

Michael E. Porter, Professor of Business Administration, Harvard University, began by contrasting the way in which a business manager views his own decision making and assessment of his company with the manner in which he supposes security analysts view and evaluate his company. The suggestion was that the manner in which security analysts go about their task, or at least the manner in which they are perceived to go about their task, might benefit from what has been learned on the managerial side about business strategy and opportunity for achieving extraordinary profit levels.

He presented a picture of the competitive structure of an industry, isolating five elements. First, there is rivalry among the existing competing firms within an industry. Second, there is a threat that new firms may enter the industry. Third, there may be bargaining power exercised by those who buy from this industry; and fourth there may be bargaining power exercised by those who sell to the industry. And finally, there may be a threat that substitute products or services can supplant the existing products and services. As all five elements will tend to limit the profit potential of a participant in the industry, it is useful to examine an industry in terms of these five elements. But simply describing the industry as it stands today is not very useful. What matters is how these elements may bring about changes in the industry, enhancing or reducing the likelihood of extraordinary profits.

Porter examined the barriers to entry element in some detail. He pointed out nine different kinds of barriers. These were economies of scale, product differentiation, brand identity, switching costs, capital requirements, access to distribution channels, cost advantages relating to being in the industry before others, government policy, and expected retaliation by competitors. The ability of one or more of those companies already in the industry to achieve extraordinary profits will depend upon the effectiveness of these barriers to the entry of new competitors who will tend to bring profits down. Porter suggested, for example, that an analysis of the personal computer industry raises the question of whether any of the leaders in that industry can develop entry barriers that will protect their profits. One possibility is establishment of brand identity. Another is the establishment of limited access to distribution channels.

Porter next went through a detailed discussion of an industry that has achieved extraordinary rates of return. This is the water meter industry. A review of the five key elements previously identified revealed why this industry was in such a fortunate position. The three companies making up the industry purchase raw materials in the form of standard commodities, and those who supply the material have little bargaining power. There are virtually no substitutes for water meters, and there is if anything a trend to more widespread water metering. Buyers of water meters are municipal water departments, where the individual making the purchase decision is likely to care much more about quality and service than about price. So there is little or no pressure from buyers to keep prices down. Entry into this industry is extremely difficult, because of economies of scale. Finally, rivalry among the three firms in the industry is low. A policy of live-and- let-live makes for stability and very high profit rates. Porter asked the participants to consider the probable effect of a significant technological innovation in water meters by a firm not already in the industry. If the particular innovation would lower the entry barriers and therefore open the industry to vigorous competition, one might expect astute companies in the industry to resist the innovation with all their strength.

Having looked at industry structure and at the elements making for high profit opportunities, Porter turned to analysis of the individual firm. He suggested three generic strategies a firm might adopt to establish a sustainable competitive advantage. A firm aiming at a broad market might aim for overall cost leadership or for product differentiation. A third strategy is to focus on a narrow market, delivering a product that has unique appeal to that market.

In discussing in some detail the cost leadership strategy, he used Gallo Wine as an example. Gallo appears to be the most profitable of the major wine producers, and it is also the lowest-cost producer. In analyzing the sources of Gallo's strength, it is especially useful to examine separately the types of products and services purchased by Gallo, the different operations carried out by Gallo itself (including pressing the grapes, aging the wine, bottling, shipping, advertising, and so on), and the channels of distribution used by Gallo. One can find in certain of these elements the means by which Gallo has been able to bring its costs well below those of its competitors.

Turning to the strategy of product differentiation, Porter used as an example Stouffer's frozen foods. Once again, an examination of the components of the purchasing, the operations of the company, and the distribution revealed where and how Stouffer has developed a reputation for a differentiated product, one that has produced extraordinary profits.

In discussing the focus strategy, Porter used as his example Loquinta, a company that provides lodging to the middle- and lower-income business traveler. Providing precisely what this narrow market wants, and no more, enables Loquinta to offer high quality at a low price on a very profitable basis.

Porter concluded by commenting on the dangers of a corporate approach that adopts a little of each generic strategy and as a result finds itself "stuck in the middle," at a low level of profitability. Rarely does a high-performance company pursue more than one of these strategies.

48. COOPERATION AND CONFLICT IN COMPETITIVE BEHAVIOR: DEREGULATION IN THE AIRLINE INDUSTRY (Spring, 1983)

David M. Kreps, Professor of Decision Sciences, Stanford University, building on the picture of competitive structure that had been furnished by Michael Porter (in presentation No. 47, above), began with the economist's version of the prisoner's dilemma. Two firms in an industry each face the choice between vigorous competition and restrained competition. Both know that should one follow a vigorous competitive strategy and the other a restrained strategy, the first will do well and the second badly. Both also know that if both firms follow a vigorous competitive strategy, neither will do well, while if both follow a restrained competition strategy, both will do well. Both then have reason to prefer the consequences of mutually restrained competition. There are two ways to achieve these benefits. One is through reciprocity and the other through separation.

Reciprocity is an alternative to competitive rivalry. Each of the two firms will refrain from vigorous competition, because each has the power to retaliate and hurt the other. Separation involves division of a market between the two competitors, so there will be some competition at the intersection of the two market segments, but otherwise the firms will leave each other alone. The success of reciprocity depends on five factors. Firms must be able to monitor their rivals, to know whether they are indeed refraining from vigorous competition. Second, there must be a means of punishing firms that cheat on the restrained competition arrangement. Third, there must be a general agreement on how the market is to be shared; fourth, all the firms in the industry must have a common view of opportunities and conditions in the industry; and fifth, there must be some way to deal with changing conditions in the industry. As an example of reciprocity, Kreps described the manufacture of large electric turbine generators by General Electric and Westinghouse since 1963.

Then Kreps turned to an analysis of the United States domestic airline industry and the structure that has emerged in the five years since deregulation. He discussed the five forces that Porter had presented early in his talk. First is customer power. Airline customers are easily classified into business travelers and vacation travelers. The former, not very price-sensitive, primarily are seeking convenience. The second are price-sensitive, yet have little influence on rates except through use of tour brokers able to arrange charter flights. Overall, the airline industry is stronger than its customers, but demand for airline services is highly elastic with respect to passenger income and therefore the state of the economy.

Second, Kreps reviewed the strength of suppliers to the airline industry. While aircraft manufacturers are highly competitive, as a practical matter there are now only two suppliers of air frames and two consortiums supplying aircraft engines. The aircraft leasing market is well-organized, and it is easy to obtain aircraft this way. Fuel supplies are important only during shortages, when the traditional customers are likely to received preferred treatment. Airport facilities are owned by municipalities and counties, and with the exception of a few oversubscribed terminals, airport facilities are available to all airlines. Time slots, which are important, are allocated by the FAA. Overall, the suppliers to the airline industry are not in a strong position and do not threaten airline profits.

The third element is substitute services. Kreps referred to common carriers and private transport, and raised the question whether electronic data transfer may at some time pose a substitution threat to the airline industry. Overall, he concluded that substitutes do not now pose a serious threat.

Fourth, the barriers to entry are very low. There is an oversupply of trained airline workers. Used aircraft are available at reasonable cost. Time slots and counter space at airports are allocated through a largely political process, and so far it has been easy for new competitors to find a place. There is little brand loyalty in the airline industry, and the glamour of the industry seems to attract new entrants. The consequences for airline profits are extremely bad.

Finally, rivalry within the industry is substantial. The major trunk carriers face high fixed and low variable costs, and when this relationship is combined with high income-elasticity, there are strong incentives for severe competition during recession. There are no accepted standard ways of setting fares, but monitoring a competitor's rates is easy. Both fares and load factors are public information for all airlines.

The end result is that the low barriers to entry and the intense rivalry among the airlines are leading to very poor financial performance, possibly to further bankruptcies, and to little prospect of a return to profitability. Clearly the industry is not following a reciprocity strategy. Kreps indicated that it is to some extent attempting a separation strategy, but conditions make it unlikely that this strategy will succeed. There are some steps the airlines might take to increase reciprocity and separation and to create some barriers to entry. Kreps, however, concluded that it will be very difficult to significantly inhibit entry and that left to itself the industry is unlikely to do well.

49. THE ROLE OF R&D IN THE HIGH TECHNOLOGY INDUSTRY: THE BATTLE FOR FRANCHISE IN INTERNATIONAL MARKETS CASE: SEMICONDUCTOR INDUSTRY (Spring, 1983)

A. Michael Spence, Professor of Business Administration, Harvard University, chose the semiconductor industry for his talk because it raises a number of issues in industry competitive strategy, and extends of the analysis Michael Porter and David Kreps had presented in preceding sessions (presentations Nos. 47 and 48).

The semiconductor industry is still not mature. Costs are declining rapidly, and participants in the industry are still engaged in strategic investment decisions. Competition is worldwide, and the public sector, including foreign governments, is playing and may continue to play a major role. Spence provided a brief history of the industry, from the invention of the transistor at Bell Labs and the development of semiconductors at Fairchild and Texas Instruments. From 1958 through 1965, the Defense Department and the space program were the chief customers. From 1966 through 1972, the computer industry was the principal user of semiconductors. And from 1972 to the present, consumer products and the industrial market have become significant. The following table shows the shift in market share by end-use.

Semiconductor Market Share by End-Use

	1960	1968	1974	1979
Computer	30%	35%	28%	30%
Consumer	5	10	24	27
Military	50	35	14	10
Industrial	15	20	34	33

There are a few key characteristics of the semiconductor industry. First, the roles of AT&T and IBM are critical. AT&T was precluded by the terms of a consent decree from entering the computer industry, used semiconductor products internally on a very large scale, and passed the technology it developed fairly freely to the market. IBM was less restricted in its external use of semiconductors, but it too found a vast internal market and it too released a good deal of technological information to the marketplace. So within this industry technology is by and large not proprietary. The major participants in the industry are AT&T and IBM, largely serving internal markets, the merchant semiconductor firms (including Texas Instruments, Fairchild, Motorola, and Intel), and systems manufacturers who have integrated backward.

Turning to the underlying economics and structure of the industry, Spence identified very high product development expenditures in the form of fixed costs, very rapid cost declines (about 35 percent per year in random access memories from 1970 to 1979), and an important learning curve. Participants in this industry must bring their costs down rapidly just to remain viable.

Next he turned to the theory of R&D in this industry. Heavy investment in R&D reduces unit costs, which in turn increases share of market, which in turn reduces the amortized R&D costs per unit, thereby providing substantial funds for R&D investment. Once this cycle is in operation for a company, it is possible to at least hold market share and maybe increase it. IBM owes much of its success to this phenomenon.

The high degree of technology spillover (corresponding to a low level of proprietary protection) is an interesting feature of the industry. On the one hand, the spillover reduces incentives to invest heavily in R&D. On the other hand, it reduces the total cost to the industry of product development. The reduction in incentives has affected the industry less than one might have anticipated. This is because AT&T and IBM, major sources of technology spillover, have had sufficient internal reasons for undertaking R&D, because the government, through military expenditures, has paid for R&D, and more recently because of cooperative behavior within the industry.

STOCK VALUATION– EVIDENCE AND EXPLOITATION AND INEFFICIENCY

50. ELEMENTS OF INVESTMENT VALUE (Spring, 1985)

Jack L. Treynor continued with a theme he had advanced at the Fall 1984 Q Group seminar, to the effect that accounting numbers are of little value in security analysis. The difficulty stems from the fact that the production of accounting numbers is a process that itself involves valuation, and hence accountants and security analysts, instead of complementing one another's work, are actually rivals in the valuation business.

Treynor pointed out that an analyst may have two quite distinct uses for a valuation model. The first is to determine the true value of a security, in the hope that this true value will differ from the market value and therefore offer a potential for profit. The test of the quality of the model in this case is the extent to which market prices move toward the values delivered by the model. The second use of the model is to evaluate new information the analyst has come upon. The test of this model is the extent to which it replicates market prices when it is supplied with information available to the market. It was this second use of valuation models that Treynor addressed in his presentation.

The value of a company is derived from the expected cash flows. Treynor argued that there are three components of the future cash flows: flows stemming from the scarcity value of rents on plant, flows stemming from a company's market franchise, and flows (negative, in this case) stemming from costs incurred by the company in defending its market franchise. It is necessary to forecast each of these three flows separately, in order to arrive at the forecasted total cash flow and therefore the value of the company. In order to forecast the three kinds of cash flows, we need a theory of oligopoly. Treynor's proposed theory is a simple one: Companies make capacity decisions as though they were monopolists, and they make output decisions as though perfect competition existed. In other words, companies decide to expand plant capacity as if they were the sole supplier of a commodity and had only to consider the most profitable level of production for the entire industry. When they decide how much to produce with existing capacity, on the other hand, they produce up to the point where prices cease to cover variable costs.

Treynor first examined the cash flows from the scarcity value of rents on plant. With the aid of some supply and demand curves, and examples taken from the airline industry, he demonstrated first, that as time goes on and new capacity is added to an industry, the new capacity is characterized by lower variable costs, so that older capacity gradually becomes obsolete. At the same time, the value of capacity, which depends upon the difference between variable cost and the price that can be charged, is quite dependent on the demand schedule and can change dramatically with changes in the demand schedule.

Turning to the cash flows to be derived from the market franchise, Treynor observed that the value of a market franchise lies in the premium price customers are willing to pay for the products of a recognized standard-setter. The premium will be greatest where customers believe that differences among the products of different manufacturers are important, and where customers have great difficulty identifying those differences. The purpose of marketing (and Treynor included product improvement within marketing) is to expand the franchise of the company or to preserve it.

Using a number of examples, Treynor showed trends over time in the cash flows generated from a market franchise and the cash expenditures necessary to expand and preserve it. The typical pattern showed a steady percentage rise in both sets of cash flows for a number of years, indicating a steady rise in the net cash flow from the market franchise. But that steady rise was generally succeeded by a sharp break and a flattening of both the cash inflows from the franchise and the cash outflows necessary to support it.

In seeking an explanation for this pattern, Treynor suggested that a company can push its market franchise only so far before competitors retaliate vigorously and neutralize the company's marketing efforts. A number of industry observations suggest a certain stability seems to prevail among producers of consumer products when each major competitor has a market share that is about 62 percent of the market share of the next larger company. One might expect that a higher share will invite retaliation and then growth may come to an end.

To conclude his presentation, Treynor considered the elements of risk in the three classes of cash flow. The scarcity value of rents on plant depends almost entirely on industry demand, something largely beyond the control of the individual company, and therefore affected by systematic risk. Because market share is independent of industry demand, the market franchise cash flows are probably subject primarily to specific risk. Cash flows to preserve market franchise reflect industry rivalry, and are subject to an uncertainty common to all companies in the industry, so the primary risk element would appear to be industry risk.

51. STOCK DIVIDENDS AND SPLIT ANNOUNCEMENTS (Spring, 1985)

Mark S. Grinblatt, Professor, Graduate School of Management, U.C.L.A., distributed a paper by himself, Ronald W. Masulis, and Sheriden Titman entitled "The Valuation Effects of Stock Splits and Stock Dividends."

Grinblatt began his presentation with some comments on financial theory and past empirical research. Signaling theory offers the proposition that analysts respect the probably superior information of company managements and look for indications from managements with respect to favorable and unfavorable changes in expected cash flows. Actions by managements, therefore, that contain information about changed cash flow expectations, are likely to affect stock prices. Raising or lowering a cash dividend would be such an action. But actions by managements that are unrelated to cash flows should contain no information of value to security analysts and therefore should not affect price. Announcements with respect to stock dividends and stock splits may contain both kinds of information: information with respect to probable cash flows, and information having nothing to do with cash flows. The former information might be expected to affect stock prices, while the latter would not.

Empirical work seems to have generally supported the theoretical propositions, but Grinblatt pointed out two significant flaws in that research. The pioneering, and most widely known, work on stock splits been done by Fisher, Fama, Jensen and Roll made use of monthly data. Grinblatt observed that the use of monthly data might capture in the reported return associated with the announcement of a stock split a run-up in price that preceded that announcement. The research reported by Grinblatt was based upon daily price data. Second, as Grinblatt observed, the earlier research had analyzed a mixture of announcements, some having implications for cash flows and some with no such implications. In the research reported by Grinblatt, announcements were carefully classified, and a sample was obtained of what he called "pure announcements," that is announcements having no implications with respect to a change in cash dividends.

The source of the data for the research was the *Wall Street Journal* and the *Wall Street Journal Index,* over the period 1967-1976, as well as the CRSP daily tapes.

Prices were tracked from ten trading days before the announcement of a stock split or stock dividend, to forty trading days following the announcement. The "announcement return" was the rate of appreciation for two days, the day of the announcement and the following day. Sometimes announcements come out before the close of trading, and sometimes after, so the immediate effect of the announcement could be on the day of announcement or the following day. For all announcements, including those conveying information with respect to cash dividends, the mean two-day return around the announcement date for the entire sample of 1,762 split and stock dividend announcements, was 3.41 percent. This was far above the 0.10 percent mean two-day return for the forty trading days following the announcement. This large sample included cases where the announcement contained some information with respect to changes in cash dividends. But the sample of 84 "pure stock dividend" announcements and 244 "pure stock split" announcements produced a mean two-day return around the announcement of 5.87 percent, an even more dramatic price effect.

Grinblatt's final conclusion then was that the research had established that, on average, there is a significant increase in a company's stock price on the announcement of a stock split or stock dividend, and this increase cannot be attributed to any other contemporaneous announcements or implied announcements having to do with cash dividends. In suggesting explanations for what had been observed, Grinblatt offered two that he felt were the most likely. One is that managements have in mind an appropriate trading range for the stock of their companies, and splits are intended to keep the price within that range. Hence a split would be a confirmation that management is optimistic about the fortunes of the company, and thinks a recently achieved high price is sustainable. A second hypothesis is that company management thinks the company is undervalued and simply wants to draw attention to its favorable prospects. Here the message contained in the announcement is that management is more optimistic than the market.

After dealing with announcement date effects, Grinblatt went on to describe research focusing on the ex-date effects. The average three-day returns from the day before the ex-date to the day after, and the average five-day returns from days minus one to plus three, were significantly larger than typical three- and five-day returns over the forty days after the ex-date. Grinblatt had no explanation for the high ex-date returns. He reported that a trading strategy based on the purchase of a security two days prior to the ex-date, with the sale of this security and the purchase of another two days before the ex-date for the other, could be very profitable over time. If the round-trip trading cost is 1 percent, $1 invested in this strategy in July 1962 would have grown to $1,000 by the end of 1983. There would have been 856 transactions, using stocks on the American and New York Exchanges. The profit would have been eliminated at a transactions cost somewhere between 1.5 and 2.0 percent. Grinblatt's opinion was that while the opportunity, considering transactions costs, might not be very attractive to individual investors, it should be quite attractive to institutional investors and especially attractive to securities dealers.

52. WHY THE EQUITY MARKET HAS A LOW P/E BIAS (Fall, 1984)

Robert L. Hagin, Vice President, Director of Quantitative Analysis, Kidder, Peabody & Co., Inc., distributed a paper entitled "An Examination of the Torpedo

Effect, or Why the Equity Market Has a Low P/E Bias."

Hagin described his starting point as the much discussed P/E and size effects that seem to indicate that above-average risk-adjusted returns can be obtained from low P/E or small capitalization stocks. In Phase I of his study, he examined P/E and size effects, concluding first that low P/E and small capitalization "institutionally owned" stocks did indeed produce superior performances from 1978 through 1982, and second, that the P/E and size effects are uncorrelated. As a result, the best-performing stocks were those in the lowest P/E and smallest capitalization subset.

In Phase II of his study, Hagin examined the relationship between actual earnings growth and investment returns. High earnings growth correlated well with high returns to investors. Further, high actual earnings growth correlated with high ex ante P/E ratios.

In Phase III Hagin tested his "torpedo" hypothesis, which states that the generally poor relative performance of stocks of companies that experience disappointing earnings growth explains the generally poor relative performance of high P/E stocks. Hagin's model assumes that if stocks are divided into quartiles according to the forecasted earnings growth rate, the quartile expected to grow least offers the possibility of pleasant earnings surprises, while the quartile expected to grow most offers earnings disappointments. Investment in the lowest expected-growth quartile is likely to lead to superior investment performance, while investment in the highest expected-growth quartile is likely to lead to inferior investment results.

Empirical testing confirmed this expectation, when the earnings forecasts were those made by Kidder, Peabody analysts for the approximately 350 companies in the firm's universe. The disappointments in the high expected-growth quartile had a very large effect on investment outcomes. These disappointments constitute the "torpedo" effect, and the resulting poor performance of the high expected-growth rate quartile leads to the above-average investment returns for the quartiles that avoided "torpedos." The lowest expected-growth quartile was the best performer, and for the stocks in this quartile, the P/E ratios were relatively low. The "torpedo" effect is then related to the P/E effect.

In Phase IV the sample of stocks was enlarged considerably, and earnings forecasts from the Institutional Brokers Estimate Service (IBES) were used. Once again, there was a high correlation between actual earnings growth and investment returns. But when Hagin classified stocks not by actual earnings growth but by surprises (that is, by the differences between expected and actual earnings growth), the investment results were not as good. Accurate forecasting of earnings surprises added nothing to accurate forecasting of earnings change. The IBES data seemed to be of no value in achieving superior returns. Furthermore, the "torpedo" effect disappeared when stocks were divided into quartiles on the basis of IBES earnings growth forecasts.

Finally, Hagin tested a sample of 220 stocks for which both Kidder, Peabody and IBES earnings forecasts were available. It turned out that for this sample the "torpedo" effect was present using Kidder, Peabody earnings forecasts, but was not present using IBES forecasts. Hagin's conclusion was that Kidder, Peabody earnings expectations are impounded in stock prices, and the quartile with the highest expected growth rate is the one to avoid, since it will probably include significant disappointments and therefore produce a low investment return.

In the discussion following his presentation, Hagin conceded that it is possible that the IBES forecasts, rather than the Kidder, Peabody forecasts, are impounded in stock prices, and that the Kidder, Peabody earnings growth forecasts are consistently biased downward for the low expected growth stocks and biased upward for the high expected growth stocks. This was something he anticipated exploring in further research.

53. ARE LOW P/E STOCKS STILL CHEAP?
(Fall, 1984)

Jack L. Treynor, Partner, Treynor-Arbit Associates, distributed a paper entitled "Are Lower Price-Earnings Ratio Stocks Still Cheap?"

Treynor began with the question of the relationship between earnings and value. Put another way, the question is: What is the economic content in the earnings number? He concluded that value is really determined by the future cash flow stream of the corporation. Conventional accounting goes about providing clues to the future cash flow stream in a rather particular way. Treynor established algebraically the components of the future cash flow stream, and derived the present values of those components, in a form that corresponds to the conventional corporate balance sheet.

Defining earnings as the change in the present value of the future cash flows, before capital transactions, led to an expression for that change in the form of a total differential. The perhaps surprising conclusion reached was that expected earnings equal the market return on the present value of the expected future cash flow stream. And this number will always be proportional to the estimate of the current value of that future stream. The conclusion Treynor reached is that the sole element in reported current earnings that has significance for an investor is the accountant's estimate of value. If earnings are based on an estimate of value, then one can hardly justify deriving value from earnings.

Treynor described the behavior of the accountant as essentially drawing on the techniques of accrual accounting to make certain that the earnings number is appropriate to the estimate of value.

In turning back to the original question, concerning the use of earnings in establishing value, Treynor suggested that there are two classes of investors: those who are influenced by reported earnings and those who are not. Both kinds of investors trade, and their judgments contribute to the establishment of prices. Investors who do not pay attention to earnings may make large errors in estimating value, but these errors are likely to be independent and the consensus therefore is likely to be unbiased.

Investors who do depend on earnings, on the other hand, will produce a biased consensus. Treynor next showed a model for establishing the equilibrium price before true value becomes apparent to everyone, and the price after true value becomes apparent, in a market in which some participants depend on earnings and some do not. In this market some accountants exaggerate the value implicit in reported earnings, an exaggeration that is partially offset by the practice of the earnings-dependent investor (who cannot tell when the accountant is exaggerating and when he is not) applies a "fudge factor" to the value implied by reported earnings.

All of this, plus a little calculus, led to the conclusion that whenever earnings-dependent investors predominate in the market for a company's stock, as the exaggeration factor increases, the average price/ earnings ratio falls, and the average price change rises. So there is a tendency for low P/E ratio and high average residual price change to be associated. Investors who buy stocks when their P/E ratios are historically low and sell when they are historically high are likely to lose money on average.

54. IS THE JAPANESE STOCK MARKET EFFICIENT? (Spring, 1984)

Takeo Nakamura, Senior Vice President and Director, Nomura Capital Management, Inc., New York City, and Noboru Terada, Senior Researcher, Nomura Research Institute of Tokyo, presented a study of the size effect and seasonality in Japanese stock returns.

Nakamura began with a brief discussion of recent United States studies on the size effect on rates of return in the United States equity market. The size effect had been identified, and then found to be very much associated with a seasonal effect. Donald Keim had found that approximately half of the superior returns of small capitalization stocks were realized in January, with the other half realized over the remaining eleven months. Some researchers had suggested that year-end tax loss selling was in large part responsible for the phenomenon.

The Nomura research began with an investigation of the effect of four factors on rate of return. The factors were market value (capitalization size), beta, earnings-to-price yield, and dividend yield. All four factors have been suggested as having a significant bearing on rate of return. For each of the factors, stocks were divided into quintiles, from smallest to largest. There appeared to be no clear correlation between beta and rate of return, or between earnings-to-price yield and rate of return. There was some correlation between dividend yield and rate of return. Ignoring the quintile of lowest-yield stocks, rate of return increased monotonically with dividend yield across the remaining four quintiles. The rate of return on the lowest yield quintile was between those of the fourth and fifth quintile. There was a clear correlation between rate of return and market value. Rate of return declined monotonically from the smallest to the largest capitalization quintile.

The lack of correlation between return and beta was examined more carefully. One might suspect that the small capitalization stocks would have higher betas, and that the negative correlation between capitalization size and rate of return could be explained on the basis of differences in beta coefficients. Yet application of both ordinary least squares and an aggregated coefficients method proposed by Dimson failed to uncover significant correlation between capitalization size and beta coefficient, and between beta coefficient and rate of return. It appeared then that a genuine small firm effect exists in the Japanese stock market.

The comparison was carried further, with an examination of excess returns. Analysis following the regression methodology of Fama and MacBeth showed that the size effect explains excess returns, while beta coefficients do not.

The seasonal effect was examined next. As in the case of the United States research, over half of the annual size effect was found to have occurred in January. Nakamura referred to work by Bulent and Mustafa Gultekin reporting on the January effect in seventeen countries, including Japan. The Nomura research found that for all Japanese stocks, the mean return was greatest in March, although for the small capitalization stocks it was greatest in January. More than half of the Japanese corporations with listed stocks have fiscal years ending in March.

The final conclusion was that there exists in the Japanese stock market a significant size effect, similar to that found in the United States, Canada, and Australia.

Nakamura closed with a discussion of the hypothesis that year-end tax-loss selling explains the small-size January effect. He concluded that Japanese tax law is such that for Japan the hypothesis has no validity.

55. TRANSACTION COSTS AND THE SMALL FIRM EFFECT (Fall, 1983)

A reprint of the article: Hans R. Stoll and Robert W. Whaley, "Transaction Costs and the Small Firm Effect," Journal of Financial Economics, *Vol. 12, 1983, was distributed. This research was funded by the IQRF.*

Hans R. Stoll, Anne Marie and Robert B. Walker, Jr. Professor of Finance, and Robert W. Whaley, Associate Professor, Owen Graduate School of Management, Vanderbilt University, presented a summary of research investigating the so-called "small-firm effect" in stock market returns, and their own work on small-firm effects adjusted for transactions costs.

Whaley began with a quick review of the Sharpe-Lintner Capital Asset Pricing Model, which indicates that for all stocks the expected risk-adjusted returns (the expected risk premiums divided by the betas for the stocks) should be the same. He then described a number of studies that reported risk-adjusted returns for portfolios of small capitalization companies that were consistently larger than those for portfolios of stocks of large companies. Studies using monthly data for United States stocks generally found an average annual return differential of about 12 percent per year between the small and large capitalization stocks. A number of studies using daily returns reported somewhat larger differentials, in the range of 20 percent to 30 percent annually. A study making use of monthly returns on Canadian stocks reported a 12.6 percent per year differential, and a study using monthly data for Australian stocks reported a differential of over 60 percent per year.

Whaley went on to describe two explanations that have been put forward for the differential. One has to do with statistical bias and suggests that the differentials that have been found by various researchers are the result of measurement errors in return or in risk. A second explanation is esentially economic, and the argument is that while size itself has little theoretical justification as contributing to expected return, it may represent a factor that does have economic significance.

The statistical explanation for the small-firm effect can be subdivided into an explanation connected with the mean return reported and one connected with the risk used in the comparison. The calculation of mean stock returns may be systematically biased upward for small capitalization companies relative to large companies, for one of two reasons. The first might be described as a compounding effect. Many of the studies making use of daily rates of return assume daily rebalancing of portfolios. It might be more realistic to assume only monthly rebalancing of portfolios, and this would reduce the returns on the small capitalization portfolios by 50 percent. A further bias comes from the bid/ask effect. In general, the closing daily price is not the true price at which a stock might be bought or sold. Using average rather than closing prices would also reduce the returns on the small capitalization stocks by about 50 percent. It has been argued too that the risk in portfolios of small capitalization stocks may be understated. Very thin trading of these stocks tends to bias the betas for the stocks downward.

Turning to economic explanations, Whaley referred to a variety of published research relating to various economic factors. Some have argued that firm size is a proxy for a missing variable, which may be dividend yield or earnings yield. It may be that the small capitalization stocks are predominantly owned by individuals whose portfolios are not fully diversified and who may demand a premium for unsystematic risk. Skewness of return may be an important risk element for individuals, and skewness may be the missing factor for which small capitalization serves as a proxy. Less information may be available for small capitalization stocks, and as a consequence investors may demand a return premium. Finally, transactions costs may play a significant part in the differential between returns on large and small capitalization stocks.

Stoll added to Whaley's review the observation that none of the statistical and economic explanations was entirely satisfactory. Whether the transactions cost effect explains the apparent small-firm effect, Stoll was not willing to say. He merely argued that transactions cost will explain a substantial part of what appears to be a small-firm effect.

Stoll and Whaley measured transactions costs in their studies in terms of a bid/ask dealer spread or a commission rate. They made no attempt to incorporate the market impact of buying and selling quantities of stock. They worked with monthly data from 1960 through 1979 for New York Stock Exchange common stocks. Stock prices, numbers of shares outstanding, and returns were obtained from the Fitch sheets, and commission rates were calculated on the basis of the New York Stock Exchange commission rates published annually.

Over the entire period, the portfolio containing the decile of smallest capitalization stocks outperformed the portfolio containing the decile of largest stocks by about 12 percent per year, where transactions costs were ignored. But after allowing for transactions costs (assuming complete sale and repurchase of the portfolio monthly), the differential was reversed and portfolios of large capitalization stock outperformed those of small stocks.

It was thought that the differential in price per share rather than the differential in capitalization size as such might be the determining factor. Classifying the stocks by price per share rather than firm capitalization produced very similar results. Before transactions costs, portfolios consisting of low-priced stocks outperformed those consisting of high-priced stocks, but after transactions costs the differential was reversed.

It´was clear that the rate at which stocks were turned over was important in adjusting for the cost of transactions. Stoll reported that the breakeven point was at about four months. If the portfolios were turned over more frequently than every four months, the large capitalization or high-priced stock portfolios outperformed. At lower turnover rates, the lower-price or smaller capitalization portfolios outperformed. All of this ignored any cost due to market movement resulting from the transactions themselves.

Summarizing, Stoll observed that the cost of maintaining a market in common stocks must be paid for by investors who buy and sell those stocks. The stocks of small capitalization corporations bear a disproportionate share of this cost, and the cost of capital for small firms is therefore increased relative to the cost of capital for large firms.

56. VALUING EQUITIES IN DISFAVOR

(Spring, 1983)

Evan Schulman, Senior Vice President, Batterymarch Financial Management Company, described a strategy implemented in early 1982, by which Batterymarch invested 10 percent of client funds in stocks of companies experiencing severe financial difficulty. Companies known to be in financial difficulty might be expected to produce rates of return to stockholders well in excess of those justified by their admittedly high risk, by virtue of a widespread reluctance on the part of institutional investors to have anything to do with them.

Schulman discussed three problem areas connected with this particular investment strategy. The first concerned a conflict of interest between the manager of institutional assets and the beneficial owners. While such a conflict is always present, it presents a special problem in the case of investment in companies that may easily enter bankruptcy. Although the potential loss to the client may be very small (with no more than 10 percent of a client portfolio diversified across at least twenty companies in distress) the potential for manager embarrassment is extremely high. The result is likely to be that clients will decline to take on the strategy even though it offers more than sufficient reward for the risk to which the beneficial owners are subjected. It is just this reluctance, of course, that creates the investment opportunity.

There is also a valuation problem. Dividend discount models are not helpful in valuing firms on the verge of bankruptcy. For these companies, market risk is not very important; specific risk is what matters. Singular events that might cause no more than inconvenience to a healthy firm can be disastrous to these weakened firms. In the absence of a valuation model, the approach at Batterymarch was to draw portfolios at random from a universe of about 120 companies identified as being in seriously weakened condition.

Finally, Schulman discussed the problem of portfolio control. The challenge was to determine an appropriate level of diversification. How many stocks had to be included in the subportfolio of weak companies to provide an acceptable diversification of specific risk? Fortunately, Cohen and Fitch had discussed the relationship between the range of portfolio returns and the number of stocks included in randomly selected portfolios, in an article entitled "The Average Investment Performance Index," in *Management Science,* February 1966. Working with a universe of about 120 stocks, Batterymarch established a minimum of 20 stocks and an upper limit of 40 stocks for the subportfolios. The actual ranges of performance for the portfolios chosen for Batterymarch clients showed wider ranges than had been anticipated, and Schulman indicated that perhaps the portfolios should have contained a larger number of stocks.

The performance results presented by Schulman for these "corporate recovery" subportfolios were generally disappointing for the second quarter of 1982, a little better for the third quarter, still better for the fourth quarter, and still better for the first quarter of 1983. For the twelve months ended March 1983, the mean return for the corporate recovery portfolios was about 67 percent, while the S&P 500 recorded 44.2 percent. The 67 percent mean was, however, accomplished by a range from about 26 percent to 108 percent, and it was not entirely clear that the mean return justified the rather wide range of return. The conclusion had to be that while the strategy had been at least moderately successful, it would take still better results to fully vindicate it.

In answer to a question, Schulman said that Batterymarch had informed its clients that 10 percent of the high-risk portfolios would be invested in the corporate recovery stocks, unless the client objected. Client portfolios of these stocks actually were chosen at random, with no two clients holding exactly the same portfolio. It was legally impossible to establish a single broadly diversified portfolio of corporate recovery stocks, in which all the clients could participate. In answer to another question, Schulman observed that the success of the strategy had been due in large part to the general market recovery, although the economic recovery that might be expected to have a major impact on these stocks had not yet gone very far.

STOCK VALUATION–METHODOLOGY AND PRINCIPLES

57. THIRTY YEARS OF CHANGE IN THE WAY WE LOOK AT INVESTMENTS (Spring, 1985)

Professor James H. Lorie of the Graduate School of Business at the University of Chicago delivered the opening address at the Spring, 1985 Seminar. He was introduced as the founder of the Center for Research in Security Prices at the University of Chicago and the individual responsible for the development of the first CRSP data tapes at Chicago approximately twenty-five years ago.

Lorie began with the state of the investment world in the early 1950s. Graham and Dodd were the authors of the leading investments textbook. Although Harry Markowitz had begun to write on portfolio theory, both the practical world of investments and the academic community were ignorant of any theory of portfolio management or capital markets. No data were available with respect to rates of return on common stocks, and no empirical research could be undertaken to investigate what factors affect returns on common stocks. The origin of the CRSP data collection lay in the desire of Merrill Lynch to publish rate of return numbers in order to illustrate the attractiveness of investing in common stocks. Four years of work, with the support of Merrill Lynch, led to the first set of CRSP tapes.

As the CRSP data became available, three other developments helped lay the basis for dramatic change. First, Harry Markowitz published his book on portfolio selection. Second, Harry V. Roberts and M.F.M. Osborne put forward the suggestion that stock prices and corporate earnings may move randomly in time, and thus the basis for a theory of efficient markets was laid. And third, computers became generally available for purposes of investment research.

The next major event was the publication of William F. Sharpe's article in 1964 on the pricing of risky assets in equilibrium. An enormous amount of empirical work was launched by this theoretical breakthrough.

Next came the research in 1969 on the effect of stock splits by Fama, Fisher, Jensen, and Roll at the University of Chicago. This study, one of the first to use the CRSP tapes, introduced the concept of "normal" and "abnormal" returns on common stocks, a powerful technique that has been used in countless succeeding "events studies." Finally, Lorie identified the Black-Scholes option valuation model as another major milestone in the development of market theory.

Turning to products and services, Lorie mentioned the development of the options market, portfolio insurance, performance measurement, and index funds as innovations paralleling the theoretical developments. The recognition of the value of diversification, flowing from the portfolio theory of Markowitz and the efficient market hypothesis, has helped foster rapid growth in international investing, and encouraged increasing use of real estate in institutional portfolios.

Looking ahead, Lorie commented on the rapid improvement in mechanisms for trading (for example, the introduction of automatic executions on NASDAQ) and predicted that execution costs will drop substantially in the future. The relative importance of commission revenue for the securities industry will continue to decline. Trading volume will increase, and liquidity will improve. On the theoretical side, he said that better explanations for returns on common stocks will be discovered. The Arbitrage Pricing Theory offers the expectation, as yet unfulfilled, of something even more useful than the Capital Asset Pricing Model.

58. THE ECONOMIC ENVIRONMENT FOR SECURITY ANALYSIS (Spring, 1983)

Peter L. Bernstein opened the seminar with a provocative presentation of the environment he perceived, and how it differs from some widespread misconceptions.

He questioned whether we have seen in the past couple of years major economic changes leading us to territory quite unfamiliar to the analyst, or whether we are simply seeing one more replay of history. Two schools of thought support the replay theory. The optimists argue that we are at present in a situation comparable to that of 1960; that is, economic mal-adjustment largely has been cured, and the five years ahead will resemble the years 1961 through 1965. The pessimists argue that we are in a situation comparable to that of 1975, enjoying temporary prosperity but saddled with endemic inflation and headed for a replay of 1976 through 1981.

Bernstein argued that both are wrong. Both oversimplify the processes of history. Illumination of both views may lie in a quotation from Schumpeter: They preach "what is congenial to the inertia of the human mind." But history does not simply replay scenarios time after time. Bernstein identified a number of significant differences between economic conditions at the present time and those that have characterized the periods in history identified by the optimists and pessimists as keys to our future.

First, at the present time no one seems to know what to do. The plans of political leaders are going awry; there is no economic position clearly identifiable with the left or with the right, with Democrats or Republicans. Second, the lack of solutions to economic problems has led to deep anxiety and skepticism in the capital market. This inhibits experimentation and limits the power of political persuasion. Third, there is a worldwide phobia about debt; neither borrowing nor lending is respectable, and this element alone differentiates the present quite distinctly from the past. Fourth, real interest rates are extraordinarily high at the present time. Fifth, no single country can go its own way in economic policy. The promises of flexible exchange rates seem to be in a shambles. Sixth, the pressure for protectionism is surging, and world trade is shrinking. Seventh, the automobile business has lost its forward momentum.

These seven characteristics, that distinguish the present from the past are reflected in three areas of investment uncertainty: uncertainty relating to differences between expected returns on stocks and bonds, uncertainty about corporate earning power created by high real interest rates, and uncertainty created by a high real wage.

Dealing first with bond and stock returns, Bernstein observed that recent experience has helped to convince us that stocks should provide higher returns than bonds. A longer view of history provides less assurance. For the thirty-three ten-year periods ending in 1909 through 1941, bonds beat stocks in twenty-two of those decades, and bills beat stocks in all thirty-three. What may be more important is that bonds have tended to perform best when the real rate of return was highest.

With respect to the second consequence, he suggested that high real interest rates may mean lower corporate growth and lower rates of return on stocks. Finally, he stressed the real wage problem. Nominal wages are less variable than inflation rates. Wages fall more slowly than the price level, so that at present we find real wages rather high. When real wages are high, employers try to reduce employment or drive wages down. This weakens economic recovery. Putting pressure on labor income means limiting consumer expenditures. This need not hurt the economy, if exports will take the place of domestic consumption. Germany and Japan, for example, found exports to the United States could solve their difficulty. But the United States today finds no nation willing to import surplus United States production.

In conclusion, Bernstein stressed that we cannot simply select future scenarios from arrays of past experience. High real interest rates are a key factor in assessing the outcome of the economy, and rationalizing the present relationship of bond to stock investment is the key to investment success in the 1980s.

STOCK VALUATION–MODELS

59. INVESTOR GROWTH EXPECTATIONS AND STOCK PRICES (Fall, 1985)

Willard T. Carleton, Karl Eller Professor of Finance at the University of Arizona, distributed a paper by himself and James H. Vander Weide entitled "Investor Growth Expectations and Stock Prices."

Carleton introduced his study as an update of the earlier studies by Cragg and Malkiel of consensus financial analyst growth expectations and stock prices, as well as an endorsement of the usefulness of the analysts' forecast tabulated by Institutional Brokers Estimate System (IBES). The Cragg and Malkiel model relates the price of a security to the expected return on the security and to a series of risk factors that cannot be diversified away. The relationship can be represented as follows:

$$\text{Price}_{j0} = \frac{\text{Dividend}_{j0}(1 + g_j)}{(\bar{R} - g_j)} + \sum_{k=1}^{k} a_k G_{jk} (1 + \bar{R})/\bar{R}$$

Where j signifies company j, the subscript 0 indicates time point zero, g_j is the expected growth rate for company j dividends, $\bar{R}$ is the risk-free rate, G_{jk} is the coefficient representing stock j's sensitivity to the common factor k, and a_k is the expected utility from a marginal increase in common factor k. Dividing both sides of the equation by current earnings, we arrive at a relationship between the price/earnings ratio, the dividend payout ratio, investor growth expectations, the risk-free rate of interest, and k common risk factors. The representation is somewhat similar to the Gordon dividend discount model.

For purposes of testing, Carleton had constructed a linear approximation to the model above, taking the following form:

$$(P/E)_j = a_0 + a_1 (D/E)_j + A_2 g_j + a_3 B_j + a_4 Cov_j +$$

$$a_5 Rsq_j + a_6 Sa_j + ej$$

where $(P/E)_j$ is the firm j's price/earnings ratio; $(D/E)_j$ is the dividend payout ratio, g_j is the forecasted earnings growth; B_j is the Value Line beta; Cov_j is the pre-tax interest coverage ratio; Rsq_j is the R squared in five-year historical earnings per share (from a log linear regression); and Sa_j is the standard deviation of the IBES five-year growth estimate for firm j.

In testing the model, there are a number of possible sources for the growth forecast g. In general, the choice lies between actual historic growth rates and genuine forecasts provided by analysts. Carleton first tested forty-one historic growth measures, including growth in earnings per share, dividends per share, book value per share, and cash flow per share, for a variety of time periods ending in 1981, 1982, and 1983, as well as "plowback growth," which is the product of the earnings retention ratio and the return on equity. He calculated correlations between all the historic growth measures and the price/earnings ratios. Few of the correlations looked promising. For the industrials the highest correlation was for ten-year growth in book value per share; for the utilities eight-year growth in cash flow per share had the highest correlation with price/ earnings in 1981 and 1982, and ten-year growth in cash flow per share had the highest correlation with price/earnings ratios in 1983.

Carleton next tested his regression model above using two different measures of future growth, g: the best historic growth rate from the correlation results, and the analysts' consensus forecast of five-year earnings per share growth from IBES. The statistical results provided "overwhelming evidence that the consensus analysts' forecast of future growth is superior to historically oriented growth measures in predicting the firm's stock price."

Conclusions with respect to risk variables were less clear. This must have been in part due to significant cross-correlation among the four risk variables, as Carleton explained.

In closing, Carleton observed that the chief weakness in the class of valuation models of which his was an example lies in the need for expected growth rates. His conclusion was that the testing he had reported confirmed the superiority of analysts' forecasts over historic growth rates and justified use of the models.

60. RECENT IMPROVEMENTS IN STOCK VALUATION TECHNIQUES (Fall, 1985)

Tony Estep of Salomon Brothers distributed a paper entitled "Valuing Common Stocks."

Estep's presentation concerned a new simple formula for estimating an investor's expected total return from a stock:

$$T = g + \frac{ROE - g}{PB} + \frac{\text{Delta PB}}{PB} (1 + g)$$

where: T = total return
g = the company's growth rate (see text)
ROE = return on equity (earnings/book value)
PB = Price/book ratio
Delta PB = change in Price/book ratio

The formula rests on two important assumptions: Earnings and book value are assumed to grow at the same rate during the anticipated holding period, and any difference between retained earnings and funds needed to finance growth calls for the shareholder to put money into the corporation or to draw it out. In other words, excess earnings are distributed as a dividend, while a shortage of earnings leads to a shareholder assessment. The model can be thought of as representing the total return on the entire common equity of the company, and it is best not to think of it as describing return per share.

Estep described the derivation of his formula, from the simple proposition that the total return is equal to dividend yield plus price appreciation. He went on to draw some interesting inferences from the equation. First, one is inclined to think that higher growth means higher expected return. But the model indicates that increasing growth actually will lower the expected return if PB is less than one. And a high PB raises the likelihood of a negative delta PB. So a focus on expected growth is not likely to be very helpful in identifying high total return.

Second, a low price-to-earnings ratio is more likely to be associated with a high total return. If the PB remains constant, then the formula can be expressed as:

$$\frac{P}{E} = \frac{ROE - g}{ROE\,(T - g)}$$

A focus on a low price-earnings multiple may work quite well in identifying high expected total returns.

Finally, from the original form of the equation one can see that the lower the value of PB, the higher the total return as long as ROE exceeds g, and delta PB is positive. So a focus on low PB may be very useful in identifying high total return.

Estep went on to explore the impact on prices if the growth rate g changes and if the entire market moves, implying a change in T for all stocks. The sensitivity of price to growth rate is greatest when growth is high, total return is low, and ROE is much greater than the growth rate. The sensitivity of prices to a change in total return for all stocks rises with T − g.

Finally, Estep reported the results of using the formula as a model. This requires one further step, to incorporate an assumption as to how PB actually changes. His assumption is that the third term in the equation can be written as:

$$\frac{PB' - PB}{nPB}$$

where PB′ is the "equilibrium" value of PB
n is the number of years required to get to PB′

With this assumption, he showed how one might apply the model to estimate expected total return for IBM. And he went on to show the results of sorting stocks into high expected-total return and low expected-total return. For the years 1975 through 1984, the high expected-return portfolio outperformed the low expected-return portfolio (using 800 medium capital ization stocks) in every year except 1980. Using the stocks in the S&P 500, the high expected-return portfolio outperformed the low expected-return portfolio in every year from 1975 through 1984.

61. USING ANALYSTS' UNCERTAINTY IN SECURITY VALUATION
(Fall, 1985)

Daniel Rie, Head of Portfolio Strategy, American National Bank and Trust Company of Chicago, distributed a paper entitled "Can Valuation Models be Made Trustworthy?"

The theme of Rie's presentation was the degree to which "noise" or error accounts for a substantial part of the message given by a stock valuation model. And he offered some ways of dealing with this distortion.

More specifically, among the consequences of noise in the modeling process are these: Those who use valuation models are accustomed to overriding results they simply do not believe; analysts are inclined to revise their inputs until the model gives the choices they intuitively prefer; whole groups of securities are likely to be misvalued; and models frequently picture opportunities that are unrealistically attractive.

Rie began with a simple model represented as follows:

$$R_j = I_j + E_j$$

where R_j is the excess return estimate for a security (that is, the difference between the expected return for the security and a passive investment of comparable apparent risk), I_j is the return contribution of genuine information, and E_j is the "noise" or error in the model prediction. Assuming that the noise and information components are independent and have an expected value of zero, we can express the variance of the predicted returns as follows:

$$\mathrm{Var}(R) = \mathrm{Var}(I) = \mathrm{Var}(E)$$

The equation makes clear that the variance of the predicted returns is exaggerated by the variance of the errors.

What we want is an estimate of the information component (I_j), and Rie showed how, with a number of assumptions, this can be expressed:

$$E(I_j) = R_j \times \mathrm{Var}(I)/[\mathrm{Var}(I) + \mathrm{VAR}\,(E_j)]$$

This expression assumes that the variance of information will be uniform across the securities analyzed, but that the variance of the error term will differ among securities. Rie went on to define an information coefficient (IC_j) as the correlation of the excess return prediction with the true information. So that:

$$E(I_j) = R_j \times (IC_j)^2$$

The IC then operates as a "shrinking factor" to scale back the valuation model estimates of returns toward the return indicated by true information.

Turning to a practical application, Rie reported the results of using data for analysts' estimates provided by Zacks Investment Research (ICARUS) and Lynch, Jones and Ryan (IBES). For each security, he calculated the coefficient of variation of the analysts' estimates and divided by the square root of the number of analysts to arrive at a measure of the percentage error expected between the consensus for the security represented by the data and a true market consensus. This he took to be the variance in the noise or error. A graphical presentation demonstrated the very wide range of the reliability of estimates across a set of securities.

So what one must do to arrive at the shrinking factor is determine the variance in the information and the variance in the error. The variance in the error comes from data on the consensus, and variance in the information comes from the institution whose analytic inputs are used in a valuation model. The table below is designed to simplify the calculations. It shows: both the standard deviations of the error and the shrinkage factors as multiples of the values for the firm with median IC. In order to use the table, one must first determine the median IC. For example, if the variance of the information component is equal to the variance of the error component, then the IC will be 0.5 for the median firm. The IC is just a measure of the relative sizes of the variances in the information and error components. Having established the median reliability in the first column of the table, one can read off the median shrinkage factor in the second column. This is the shrinkage factor for the median-reliability firm.

TABLE

SHRINKAGE FACTOR RELATIVE TO MEDIA FOR DIFFERING LEVELS OF RELIABILITY

MEDIAN RELIABILITY FIRM IC	MEDIAN SHRINK FACTOR	ERROR STANDARD DEVIATIONS RELATIVE TO MEDIAN RELIABILITY FIRM								
		0.25	0.50	0.75	1.00	1.25	1.50	2.00	3.00	5.00
1.00 *	1.00 *	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.70 *	0.49 *	1.92	1.62	1.29	1.00	0.78	0.61	0.40	0.20	0.00
0.50 *	0.25 *	3.37	2.29	1.49	1.00	0.70	0.52	0.31	0.14	0.05
0.25 *	0.06 *	8.26	3.37	1.70	1.00	0.65	0.46	0.26	0.12	0.04
0.10 *	0.01 *	13.91	3.00	1.76	1.00	0.64	0.45	0.25	0.11	0.04
0.00 *	0.00 *	16.00	4.00	1.78	1.00	0.64	0.44	0.25	0.11	0.04

But reliability varies greatly across firms, so one must determine for a particular security how its reliability relates to the median reliability. The choices offered in the table range from 0.25 of the median reliability up to five times the median reliability. After determining the appropriate relative measure, that is, the appropriate column of the nine columns on the right side of the table, one multiplies the median shrinkage factor by the corresponding number in one of these nine columns. This gives the shrinkage factor for the particular security to which the model has been applied. For example, if we believe the median firm IC is 0.50, the median shrinkage factor is 0.25. And if the data (from IBES, for example) on the consensus for our firm indicate an error of 0.5 relative to the median firm, then we read off 2.29 under the column headed 0.5 and multiply it by the 0.25 median shrinkage factor to arrive at 0.57. This means that the model output expected excess return should be multiplied by 0.57.

Rie showed the results of applying this methodology to the output of a valuation model. The raw output of the model arrayed predicted returns by ten deciles. After adjustment the first six deciles turned out to be essentially the same.

62. ANOTHER LOOK AT DIVIDEND DISCOUNT MODELS (Spring, 1985)

Richard O. Michaud, Senior Vice President, Zacks Investment Research, distributed a paper entitled "Another Look at Dividend Discount Models."

Michaud's presentation was built on an earlier discussion of dividend discount models he gave at the Q Group seminar in the spring of 1982. At that seminar he had discussed the standard dividend discount model, the yield bias that he had found in that model, and a "conditional valuation" dividend discount model that controlled the yield bias. In this presentation, he reviewed the yield bias and the usefulness of the conditional valuation model, and went further, to describe a second bias in the standard model and a way of dealing with it.

Michaud began with some general comments on the traditional dividend discount model. Despite its weaknesses, it has some special strengths. It operates with forecasted, not simply historical, data and it is a fundamental rather than a technical model. Hence it is an appropriate model to use even in the context of a semi-strong efficient market hypothesis. Michaud stressed that the dividend discount model is an effective tool for the efficient management of investment information. It is, however, a bottom up and not a top down model. It is dependent on an economic scenario, and in its standard form does not lend itself to changes in that scenario.

As he had pointed out at the earlier seminar, Michaud noted that the standard dividend discount model is subject to an arbitrary yield bias. The conditional valuation model lets the user control dividend bias. A scaling methodology allows the user to impose upon the model a forecasted slope and intercept of the market line. For convenience, Michaud had proposed three default scenario versions of the conditional valuation model. The so-called "yield" model presumes a flat market line; the "balanced" version presumes a market line with a 6 percent risk premium, and the "growth" version presumes a market line with a 15 percent risk premium. Imposing the risk premium forecast, by way of a scaling methodology, on the model changed the yield bias and hence the performance of the model. The conditional valuation model did better than the standard model when *ex post* yield and return were negatively related, but worse when *ex post* yield and return were positively related. That is, when a yield bias was appropriate, the standard model did better than the conditional valuation model, and when the yield bias was inappropriate it did less well.

Michaud was now able to report a second *ex ante* bias in the standard dividend discount model. This takes the form of a large negative correlation between *ex ante* yield and growth measures. Since it turns out that the *ex post* correlation between yield and growth averages to about zero, there appears to be something wrong with a strongly positive *ex ante* correlation. Michaud demonstrated why this inconsistency significantly reduces the effectiveness of the standard model. The inconsistency can be eliminated through a truncation. The valuation is based entirely on discounted forecast dividends up to a specified finite horizon, plus a final price at that horizon. For testing purposes, the final price was set by capitalizing the horizon forecast dividend at 5 percent.

In describing tests of the conditional valuation model, with and without truncation, Michaud emphasized evidence on the alphas for the various models. The measure of the success of the model is the correlation between the alphas forecast by the model and the actual *ex post* alphas. The superiority of one model over another is demonstrated by the difference between these correlations for the two models. In a market environment in which the *ex post* yield-return correlation was negative, it turned out that the less yield-biased models performed better than the standard model. This was what one would expect. It also turned out that in this market environment truncation (which tended to turn negative yield-growth correlations into zero or positive correlations) worsened the value of the models. This, too, was predictable.

When the *ex post* yield was positively related to alpha, the standard dividend discount model significantly outperformed both the balanced and growth conditional valuation model, and when *ex post* yield was negatively related to alpha, the standard model significantly underperformed.

Michaud stressed that the problems with the standard model can be converted into virtues, through truncation and the conditional valuation adjustments. The user of the model must control two biases, both of which should reflect top down analysis.

63. DETERMINANTS OF STOCK PRICES
(Spring, 1985)

Terry A. Marsh, Assistant Professor of Finance, Sloan School of Management, Massachusetts Institute of Technology, distributed a paper by himself and Robert C. Merton entitled "Dividend Behavior for the Aggregate Stock Market."

Marsh opened by questioning whether dividends determine stock prices or stock prices determine dividends. The dividend discount model defines stock price as the present value of dividend expectations. At the Q Group Seminar in the spring of 1981, Robert V. Shiller had presented a paper in which he compared the present value of expected dividends with the present value of actual dividends. The former should have been less variable than the latter, but Shiller found the reverse. His proposition was that stock prices showed more variability than could be explained by dividend expectations.

Marsh's proposition was that causality flows from price changes to dividend changes. And he offered to explain the empirical findings of Shiller that had caused so many people to surmise that stock prices are excessively variable. Marsh's starting point was the early Lintner model of dividend behavior. Lintner had found that most corporations had a target payout ratio and that dividends were changed only when management perceived a permanent earnings change. With these propositions in mind, Marsh developed the following equation:

$$\mathrm{Log}\ \left|\frac{D(t+1)}{D(t)}\right| = \mathrm{Alpha}\left|1-\frac{D(t)}{E^{m}(t)}\right| +$$

$$\mathrm{Lambda}\left|\frac{E^{m}(t+1)}{E^{m}(t)E^{m}(t)} - m(t)\right| + \mathrm{Gamma}\left|\mathrm{Beta}-\mathrm{Log}\,\frac{D\ (t)}{E^{m}(t)}\right|$$

where D(t) is the dividend in year t, so that the expression on the left side of the equation represents growth in dividends from year t to year t+1. Alpha is the aggregate cost of capital, and E (t) is the "permanent" earnings per share in the year t, so the first expression on the right-hand side of the equation represents a growth rate in earnings. m(t) is the long-run normal growth in permanent earnings, and lambda is a parameter, so the second expression on the right side of the equation represents án adjustment in the growth of permanent earnings to a long-run stable growth. Beta is the target dividend payout ratio, and gamma is a parameter, so the last term in the equation represents an adjustment of the payout ratio toward the target. The expression then embodies the Lintner model of dividend determination. Now, permanent earnings are defined as the annuity equivalent of the share value assessed at the beginning of a time period. With price equal to value then,

$$E^{m}(t+) = \text{Alpha}\ P(t)$$

With this substitution, Marsh obtained the following equation:

$$\text{Log}\left|\frac{D(t+1)}{D(t)}\right| + \frac{D(t)}{P(t)} = A_0 + A_1\,\text{Log}\left|\frac{P(t)+D(t)}{P(t-1)}\right|$$

$$+\ A_2\,\text{Log}\left|\frac{D(t)}{P(t)}\right| + u(t+1)$$

The implication of this equation then is that prices forecast permanent earnings. The logic is that price changes anticipate dividend changes are based upon changes in permanent earnings. So long as the stock price forecast is consistent with management assessments of permanent earnings, upon which dividend changes are presumed to be based, then the equation should represent the relationship between dividends and prices. The equation is now in regression form, and Marsh presented regression results. Using data for the Standard & Poor's 500 Index, for the period 1928 through 1980, he obtained the following:

$$\text{Log}\left|\frac{D(t+1)}{D(t)}\right| + \frac{D(t)}{P(t)} = \underset{(0.178)}{-0.140}$$

$$+\ \underset{(0.069)}{0.426}\ \text{Log}\left|\frac{P(t)+D(t)}{P(t-1)}\right|\ -0.056\ \text{Log}\left|\frac{D(t)}{P(t)}\right|$$

$$\bar{R}^2 = 0.41$$

The R-squared for the regression is fairly high, and Marsh expressed satisfaction with the result. He concluded that he had a good mechanism for forecasting dividends, one that demonstrated that past price changes are a better guide to future dividends than past dividends. He went on to demonstrate that a regression making use of actual accounting earnings could not produce a better explanation of dividends.

Returning to the earlier findings of Shiller, Marsh pointed out that his model, making use of price data, outperforms the predictive power of Shiller's model, which makes use of the past time series of dividends. So prices are a better predictor of dividends than are dividends themselves. Further, the Marsh model explains the apparent excessive variability in stock prices.

A further interesting conclusion was that the signaling theory explanation for individual corporate dividend decisions cannot be the sole explanation for dividend changes. As dividends in the aggregate appear to fit the Marsh model, it seems unlikely that they reflect a summation of signaling decisions across all corporations. Marsh indicated that he is now undertaking an adaptation of his model to individual companies, comparing the earnings forecasts implied by the model with earnings forecasts made by analysts.

64. HOW THE INSTITUTIONAL EQUITIES MARKET WORKS (Spring, 1984)

Herbert F. Ayres, Chairman of Ayres, Barry Corporation, presented a methodology developed by himself and John Y. Barry for the timing of equity investments.

Ayres proposed four key variables for an amalgamation of all United States industrial corporations, which he designated Super Corp USA, and for which he took the Standard & Poor's 400 Index as a proxy. The key variables were dividends per share, earnings per share, book value per share, and market price per share. He next introduced four equations. The first was:

Discount Rate = Dividend Yield + Nominal Growth Rate (1)

This is simply the traditional Gordon-Shapiro equation for the discount rate applied by the market in arriving at a stock price. The second and third equations were identities:

Discount Rate = Real Discount Rate + Inflation Rate (2)
Inflation Rate = Nominal Growth Rate − Real Growth Rate (3)

Combining these equations gives a fourth:

Real Growth Rate = Real Discount Rate − Dividend Yield (4)

Next, Ayres assumed the real discount rate is 7.5 percent. His justification for this was that a number of historic studies of rates of return, including those of Lorie and Fisher and Ibbotson and Sinquefield, and others going back much farther in history, had indicated a real rate of about 7.5 percent. Using data for the S&P 400 Index, Ayres calculated the dividend yield as a four-year moving average of quarterly data. From the quarterly dividend yield, and the 7.5 percent real discount rate, he was therefore able to calculate from equation (4) a quarterly estimate of the real growth rate. Ayres showed a tabulation of the calculated real growth rate estimate from the second quarter of 1960 through the fourth quarter of 1982. The range was from a low of 1.3 percent, in the second quarter of 1982, to a high of 4.8 percent, in the fourth quarter of 1972. Ayres argued that this was a reasonable range.

Ayres next calculated estimates of the nominal growth rate, as a four-year moving average of quarterly data for growth (return on common equity) × (1 payout ratio). Return on common equity is the ratio of earnings per share to book value per share, and the payout ratio is the ratio of dividends per share to earnings per share. With values for the nominal growth rate and the real growth rate, equation (3) gave the inflation rate. And Ayres presented a tabulation of the estimated inflation rate by quarters from the second quarter of 1962 through the fourth quarter of 1982. The range was from some small negative numbers in the 1960s to a high of 6.9 percent in the second quarter of 1980, falling to 6.5 percent in the fourth quarter of 1982. It is important to note that the growth rates and the inflation rates represent very long-term expectations.

To his tabulation of the estimated real growth rate and the estimated inflation rate, Ayres added a tabulation of the actual market price to book ratio. Using the three series, he argued that two factors drive the stock market: the business cycle and the change in long-run inflation expectations. A regression of the quarterly change in the real growth rate expectation on the quarterly change in the inflation expectation (using the series tabulated by Ayres) led to a regression coefficient of -0.8. This then represented the negative impact on expected real growth expectations for common stocks induced by an increase in the expected rate of inflation. For the regression, the t-ratio was -15, the R-squared was 0.8, and the Durbin-Watson statistic was 1.0. In commenting on the low Durbin-Watson statistic, Ayres said that there was a cyclical behavior in the regression residuals.

Next, Ayres showed a chart of actual inflation rates and his estimated expected inflation rates for 1950 through 1983, and he discussed the manner in which investors appeared to revise their long-run inflation expectations as the actual current rate of inflation rises and falls.

Finally, Ayres related the series he had developed to the business cycle. He commented that the stock market and the economy reach the top of a cycle almost simultaneously, and he argued that this is consistent with a disaster-averse market that has difficulty measuring business cycles. But he would not expect the bottom of the business cycle to coincide with the bottom of the stock market. Here he argued that as business activity falls, investors do not know whether they should anticipate another cycle bottom and a recovery, or whether complete catastrophe is at hand. So the stock market bottom is reached only when investors become convinced that what they are facing is a cyclical downturn in the economy. Ayres argued that this takes place after the downward curve of business activity has passed an inflection point, and the slope of the curve ceases becoming more negative and begins to become less negative. His prediction then was that market bottoms would fall between that inflection point and the bottom of the business cycle. On a chart of market price to book ratios for the S&P 500 Index, also showing gross national product seasonally adjusted and *ex post* adjusted, together with another GNP series adjusted for cycles, he pointed out that almost all of the market tops coincided with business cycle tops, and almost all of the market bottoms came about between the inflection point and the bottom of the business cycle. The chart seemed to vindicate the theory of stock price behavior through the business cycle and suggested how an investor could make market timing decisions to profit from the overreaction of the market.

65. ARBITRAGE PRICING THEORY A PRIMER (Fall, 1983)

A paper entitled "The Arbitrage Pricing Model APT: A Primer," by Edwin J. Elton and Martin J. Gruber, was distributed.

Eugene E. Record, Jr., Vice President, Thorndike, Doran, Paine and Lewis, introduced the arbitrage pricing theory part of the program at the Fall 1983 Seminar. Edwin J. Elton and Martin Gruber, Professors of Finance, Graduate School of Business Administration, New York University, presented an introduction to the theory. Gruber described the presentation as consisting of three parts: the mechanism of APT for transforming a return generating process into an explanation of asset prices, implementing the APT, and consistencies or inconsistencies between the APT and the Capital Asset Pricing Model.

To show how the APT works, Gruber began with the well known single-index return generating model developed some years ago by William F. Sharpe:

$$R_i = \text{Alpha}_i + \text{Beta}_i R_m + e_i \text{ where } E(e_i e_j) = 0 \qquad (1)$$

In the equation R_i stands for the actual rate of return over a period of time for an investment in a risky asset, such as a share of common stock. R_m is the rate of return over the same period of time achieved by "the market," frequently represented by the S&P 500 Index. Beta is the familiar beta coefficient for the asset, which records the sensitivity of the return on the asset to the return on the market. Alpha_i is the return that would be achieved by the risky asset if the return on the market were zero. Finally, e_i represents an error term, to reflect the fact that the actual rate of return achieved by an asset is never precisely explained by the other terms in the equations. The expression $E(e_ie_j) = 0$ means that the error terms for different asset returns are uncorrelated. The equation represents a return generating process. That is, it explains where the rate of return on an asset comes from.

Some important consequences flow from the single-index model. In a large diversified portfolio, because the $e_i$values for different assets are uncorrelated, the residual risk will approach zero. The return for a portfolio is just the weighted sum of the returns for the assets in the portfolio (the weights are the proportions of the assets included in the portfolio), and the beta for the portfolio is a weighted sum of the betas of the individual assets.

Gruber moved next to an expression for the return generating process that is a little more complex than the Sharpe single-index model:

$$R_i = \text{Alpha}_i + b_{i1}I_1 + b_{i2}I_2 + e_i \qquad (2)$$

The equation above is that for a two-index model. As in the case of the single index model, the return and the beta (now b_{i1} and b_{i2}) for a portfolio are simply the weighted averages of the returns and betas for the assets in the portfolio.

From the return generating model we can move to an expected return model:

$$E(R_i) = R_z + b_{i1}\ \text{Lambda}_1 + b_{i2}\ \text{Lambda}_2 \qquad (3)$$

Here $E(R_i)$ is an expected return, R_z is the return when Lambda_1 and Lambda_2 are zero; Lambda_1 and Lambda_2 are factors contributing to the expected return, and b_{i1} and b_{i2} are the sensitivities of $E(R_i)$ to those factors. In the return generating model, a number of factors may be found to "explain" the actual return on an asset. All these factors can be useful in establishing the covariance relationships for R_i. But in the expected return equation, the factors or indexes are only those that contribute to the expected return. The terminology used in equation (3) is actually that of the APT. The essence of the APT is that it includes only factors that contribute to expected returns.

We can explain the terms in equation (3) above as follows: R_z is the riskless rate of interest, or the expected return on a zero beta portfolio. Lambda_1 is the return on a portfolio that has one unit of sensitivity to index number 2 and none to index number 1.

The APT is not limited to two indexes. In general, the return generating process is described by equation (2) with as many factors as seem relevant, and the corresponding pricing equation is given as equation (3) with as many factors as contribute to expected return.

Elton turned the discussion to testing of the APT. He pointed out that all that the APT undertakes is to set up a structure for pricing assets. It does not identify the particular factors from which the price is derived. The Capital Asset Pricing Model, on the other hand, does identify the factors it uses. In equation (3) above, Lambda_1 might be a market index, with b_{i1} a measure of the sensitivity of the asset return to the market index return. Lambda_2 might be an inflation-related index, with b_{i2} a measure of the sensitivity of the return on the asset to the inflation index.

Elton observed that there are three ways of testing the APT. The most commonly used method involves a test of the sensitivity measures (the b_{i1}, b_{i2}, etc.) and the indexes (the Lambda_1, Lambda_2, etc.) Simultaneously. A second method involves specifying the b_i sensitivities and estimating the indexes, while a third method involves specifying the indexes and estimating the b_i's. He began by discussing the first method.

What we would like is a set of b_i's and indexes such that the indexes explain all the rate of return effects shared by all assets, and the residuals (the error terms) for the various assets are uncorrelated. We use a statistical technique known as factor analysis to find the set of b_i's and indexes that will explain as much of the covariance among the asset returns as possible. He referred to the study by Richard Roll and Stephen Ross, who used fourty-two sets of thirty common stocks each, selecting five as the correct number of indexes. Elton discussed the tests one would perform on the results of the analysis, as well as some of the problems encountered in the testing.

Gruber continued with a discussion of the second and third methods of testing. One can either specify what the indexes should be or one can specify what the b_i's should be. He referred to some earlier tests of the Capital Asset Pricing Model as examples of specifying indexes and testing to see whether returns are consistently related to those indexes.

In considering how one might go about choosing a set of indexes for factors, Gruber suggested the Salomon Brothers model, which makes use of (1) the growth rate in the consumer price index, (2) the real rate of growth in gross national product, (3) the real rate of increase in oil prices, (4) the real rate of increase in defense spending, and (5) the real rate of interest.

Elton concluded the discussion, turning to a comparison between the APT and the CAPM. In principle, if the APT factors are priced according to the CAPM, then the two theories are consistent. The test then consists of converting a multi-index model to an APT pricing model, and then testing whether the indexes are actually priced in the APT model.

66. THE MERITS OF APT FOR PORTFOLIO MANAGEMENT (Fall, 1983)

A paper by Richard Roll and Stephen A. Ross entitle
"The Merits of the Arbitrage Pricing Theory for Portfoli

Management" was distributed.

Richard Roll, Allstate Professor of Finance, Graduate School of Management, University of California, Los Angeles, referred to the paper he had distributed and his presentation as consisting of two parts: an intuitive explanation of the arbitrage pricing theory, and a discussion of the use of the theory for strategic portfolio management.

The APT rests on a very few assumptions. First, there are only a few systematic and pervasive forces affecting the long-term average returns on all financial assets. Only unanticipated changes in these forces will bring about changes in the prices of the assets. Actual returns on the assets will differ from the expected returns for two reasons. The first is unanticipated changes in the systematic forces, and the second is unanticipated changes in diversifiable or "idiosyncratic" forces. In a large and diversified portfolio, however, the idiosyncratic risk cannot have much effect. Only the systematic forces really matter. The expected rate of return on such a portfolio is then determined by its exposure to the systematic forces. Finally, two well-diversified portfolios with the same exposure to systematic factors will sell at approximately the same price.

In the course of their empirical work, Roll and Ross had identified four macroeconomic factors they think will affect the rates of return on all assets. The four are unanticipated inflation, changes in the expected level of industrial production, unanticipated shifts in the risk premium, and unanticipated shifts in the term structure of interest rates. Shifts in the risk premiums were taken to be changes in the yield spread between high- and low-grade corporate bonds. In explaining the choice of these four factors, Roll observed that because the value of any asset is the present value of the expected cash flows from that asset, changes in the expected flows themselves and changes in the discount rate will produce changes in the present value or price. One might expect unanticipated inflation and changes in the expected level of industrial production to be related to the cash flows. And it seems reasonable to relate unanticipated shifts in the risk premium and in the term structure of interest rates to changes in the discount rate.

Roll demonstrated graphically the linear relationship between the actual return on an asset and actual movements in one of the four factors. He also demonstrated the linear relationship between the expected return on an asset and the sensitivity of the return of the asset to one of the four factors. And finally, he showed graphically how arbitrage opportunities guarantee that points representing the expected return and the sensitivity to a particular factor for different assets must lie on the same straight line.

Having identified the four factors he and Ross have proposed to explain expected returns on assets, Roll discussed how one might go about calculating the sensitivities of asset returns to these factors. He included in the difficulties of estimating a sensitivity the fact that there is a good deal of idiosyncratic "noise" in most measurements, especially in equity returns. Unexpected changes, which are critical to the four factors chosen, are difficult to estimate and cannot always be determined frequently enough to provide sufficient observations.

Turning to strategic planning, Roll suggested that it is important as a starting point to know the sensitivity of each asset and liability of the corporation and its pension fund to systematic risk (to the four factors following his example). One might then proceed to determine the most desirable exposure of the entire portfolio of corporate assets and liabilities (including pension fund assets and liabilities) to systematic economic risks. Having chosen the appropriate set of sensitivities for the corporate portfolio, we now want to move the actual sensitivities toward the target. At this point a tactical risk positioning comes into play. In the process of establishing appropriate systematic risks, we would like to reduce unsystematic risks as far as possible.

Finally, Roll turned to the relationship between APT and the Capital Asset Pricing Model. He pointed out that there is no inherent conflict between the two theories. If the market index chosen for the capital asset pricing model is an optimized portfolio, then the CAPM will be correct. And the APT can also be correct. However, if the market index used for the CAPM is not an optimized portfolio, then the CAPM will give the same expected return for assets for which the APT will give different expected returns. This makes it possible to use APT to explain apparent "anomalies" identified by use of the Capital Asset Pricing Model. For example, a number of researchers have demonstrated that small capitalization companies offer higher rates of return than can be explained by the CAPM. The APT can be used to determine whether the apparent attractiveness of the small capital asset pricing stocks is no more than the results of evaluating them with a defective CAPM.

67. A REEVALUATION OF APT
(Fall, 1983)

A paper by Phoebus J. Dhrymes, Irwin Friend, and N. Bulent Gultekin, entitled "A Critical Reexamination of the Empirical Evidence on the Arbitrage Pricing Theory," was distributed.

Irwin Friend, Edward J. Hopkinson Professor of Finance and Economics, Wharton School, University of Pennsylvania; Phoebus J. Dhrymes, Professor of Economics, School of International Affairs, Columbia University; and Bulent Gultekin, Associate Professor, Wharton School, University of Pennsylvania, described a series of tests of the arbitrage pricing theory.

Dhrymes began by describing the APT model as a very appealing one, largely because it is unencumbered by restrictive assumptions. However, although early empirical testing was encouraging, more careful recent testing suggests caution. He went through the mathematical derivation of the model, to arrive at the testing that has been reported by Ross and Roll, and the more recent testing undertaken by Dhrymes and his associates.

The principal difficulty presented by the original Ross and Roll empirical testing lies in the fact that for computational reasons they divided their universe of securities into fourty-two subgroups and treated the subgroups as cross-sections of the universe. Ross and Roll concluded that a maximum of five factors was necessary to explain their security returns. Dhrymes reported that he and his colleagues had found that the number of factors depends very much on the size of the groups of securities being analyzed. They used subgroups of the same size as those tested by Ross and Roll, but they also examined larger subgroups. It turned out that the number of factors was about 10 percent of the number of securities in the subgroup. What they were not able to establish was whether the number of factors would stabilize as the size of the subgroup was increased. Computational limitations forced them to stop at a subgroup of ninety securities.

Friend continued the presentation to describe two kinds of tests necessary to validate the model. The most important is a test of whether the intercept of the cross-sectional regression is the risk-free rate. For the fourty-two groups, only thirteen of the intercepts were significantly different from zero. A second test should show that common measures of risk are relevant to security prices, while measures of residual risk are not. The research reported, however, showed that the risk premium vector was rarely significantly different from zero, and there was some evidence of a risk premium for standard deviation.

Finally, Gultekin reported on the results of extending the time period over which the testing was performed. Dhrymes had observed that as the number of securities in the subgroup increased, the number of factors increased. Gultekin reported that as the time period for the testing increased the number of factors also increased. In summarizing, he commented that the number of factors appears to be sample-specific. The testing did not provide enough assurance that the intercept of the cross-sectional regression is the risk-free rate, nor did it provide satisfactory evidence that the common factors do contribute to returns. There is simply a good deal more work to be done before we have a valid empirical test of the arbitrage pricing theory.

68. APT VS. MPT AS A PRACTICAL TOOL FOR INVESTORS

(Fall, 1983)

A paper by Andrew Rudd, entitled "The APT vs. the CAPM as a Practical Tool for Investors," was distributed.

Andrew Rudd, Managing Director, BARRA, began by discussing weaknesses common to all security valuation models, and the rationale for continuing to develop such models. We hope the models will give us new insights and, what is even more important, we hope to improve investment decision making. In general, we know there are sources of investment risk for which investors demand compensation. What we would like to know is what those sources are and how much compensation investors demand for each.

There are two approaches to the development of valuation models. One is equilibrium analysis, by which we try to understand supply and demand and come up with equilibrium conditions. The Capital Asset Pricing Model is based on equilibrium analysis. A second approach involves arbitrage analysis. The Modigliani and Miller propositions for capital structure were based on this kind of analysis, as was the Black-Scholes option valuation model. The arbitrage pricing theory is another model based on arbitrage analysis.

Summarizing the characteristics of the CAPM, Rudd commented that in its simple form it is a single-factor model, with the factor being the return on the market portfolio. The model offers a number of insights, and through its beta coefficient and market excess returns it is useful in evaluation and decision making. The arbitrage pricing theory involves one or more factors, and one must assume that the correct number of factors is known. In its approximate form, the theory prices securities but only in terms of factors that have no necessary economic significance. The CAPM is based on the proposition that investors can expect to be compensated only for systematic risk. The arbitrage pricing theory does not tell us whether compensation will be limited to systematic risk or whether it may extend to diversifiable or specific risk.

Rudd described the use of the Capital Asset Pricing Model as consisting of first choosing a proxy for the market portfolio, next estimating values of beta, next estimating the market excess return, and then using the model to estimate the expected return on a security. Using the APT requires first a determination of the number of factors, next finding values for the factors, next estimating the factor loadings, then deciding whether the asset is priced well or poorly by the model, and estimating the rate of return. So far, the CAPM appears to be more useful.

A number of suggestions have been made for improving the CAPM by replacing the single factor with a series of factors. Different suggestions have been made as to the appropriate factors to use, but it seems clear that most multi-factor models are useful, practical tools. It is also possible to extend the arbitrage pricing theory. Roll, in an earlier presentation (presentation No. 66), had suggested four macroeconomic factors.

In conclusion, Rudd argued that a multiple-factor model is a useful, practical tool. Either factors or factor loadings can be prespecified. But one has great difficulty identifying economic content in factors produced by the arbitrage pricing model itself. It is especially difficult to follow factors across time or across stocks. It is probably impossible to find unambiguous tests for either the CAPM or the APT.

69. A STUDY OF THE COVARIATION AMONG ASSET RETURNS
(Fall, 1983)

A paper by Michael R. Gibbons entitled "Empirical Examination of the Return Generating Process of the Arbitrage Pricing Theory" was distributed. This research was funded by the IQRF.

Michael R. Gibbons, Assistant Professor of Finance, Graduate School of Business at Stanford University, began by pointing out that factor analysis methodology is relevant to applications of both the arbitrage pricing theory and the Capital Asset Pricing Model. His own work was concerned with the former.

He described the set of data on which he had performed factor analysis. Forty-one portfolios of New York Stock Exchange stocks were formed from the monthly data base (January 1953 through July 1971) from the Center for Research in Security Prices. All returns were transformed into continuously compounded excess returns, by subtraction of the thirty-day Treasury bill rate.

The first results reported were somewhat similar to those that had been presented by Dhrymes, Friend and Gultekin at an earlier session of the seminar (presentation No. 67). Unlike the conclusion reached earlier by Ross and Roll (presentation No. 66), that five factors were enough, it appeared that even eight factors were not sufficient to establish a factor structure for the forty- one industry portfolios.

Gibbons suggested a further problem, raising the question of just what is meant by an "industry factor." He set out a simple example to show that two firms, each investing in the same two assets, produce returns whose explanation calls for two factors. So one would expect to find the underlying factor driving the returns on the assets, and a second "industry" factor. There is no reason why this industry factor would be "priced" or contribute to the returns for the two firms. In other words, if firms in the same industry tend to invest in the same set of real assets, one may observe industry factors that are not priced, using the factor analysis of the arbitrage pricing model. But while this appears to detract from the theory, the industry factors will still be useful in examining the covariance structure of returns and making asset allocation decisions. Gibbons drew a careful distinction between factors that are priced and are therefore important in any model explaining expected returns, and factors that are not priced but are still useful in helping to diversify away residual risk and to establish desired levels of sensitivity in a portfolio.

Next, Gibbons described the factor analysis of a set of bonds, rather than stocks. As in the case of the stock returns, a very large number of factors seem to be required to describe the covariance structure. Although a two-factor model was not statistically sufficient, Gibbons felt that intuitive reasoning justified analysis of the two-factor results, and it seemed plausible to identify one of the factors as the short-term bond factor, and the other as the long-term bond factor. The correlation between these two factors was 0.91, but factor loadings from the short-term factor appeared only for short term and intermediate-term bond portfolios, while factor loadings for the long-term factor appeared only for intermediate- and long-term bond portfolios.

Finally, Gibbons combined the stock and bond returns and repeated the factor analysis. Once again, apparently a very large number of factors was necessary. Gibbons chose to work with a six-factor model, identifying three interest rate factors, one common to all bond returns, with the other two apparently representing short-term and long-term factors. Another important factor could be identified as a stock market factor, because it was common to all stock returns but only to one bond return–that for long-term corporate bonds. Another two factors affected only some stock returns and no bond returns, and Gibbons identified those factors as probably a retail trade factor and an oil factor.

It was interesting that the six factors did not explain any more of the variation in return for the stock portfolios than did the single-index market model. Gibbons observed that if one were looking for a high degree of explanation one would be disappointed by the factor analysis. But what we are trying to accomplish with this analysis is not to achieve a high R square, but to explain the covariance structure.

Finally, Gibbons discussed another issue that had been raised in the earlier presentation by Dhrymes, Friend, and Gultekin. When he divided his time period into two subperiods, the covariance matrix for the forty-one industry portfolios was clearly not the same for the two subperiods. At the same time, the correlation matrix did appear quite stable through the two subperiods. One could conclude that the covariance matrix is not stable, but so long as the correlation matrix is stable, factor analysis is still feasible so long as the returns are standardized for changing variance.

Gibbons closed with a number of overall conclusions. First, to allow for the changing covariance matrix, returns should be adjusted to reflect changes in variance over the full time period study. Second, it is important to incorporate several classes of assets in factor analysis. Third, unfortunately the tests for determining the number of factors seem quite sensitive to the number of securities and the sampling period.

70. EARNINGS MOMENTUM IN EQUITIES
(Spring, 1983)

The analysis reported by Henry B. Rainville, Assistant Vice President, Manufacturers Hanover Trust Co., was addressed to earnings changes, stock price changes, and the relationship between the two. The first series of tests compared earnings growth with stock price change. The data were taken from the Compustat tapes covering the years 1974 through 1982. The table below illustrates the results.

Percent of Securities Outperforming
the Median Price Change
by Earnings Quartile

Quartile	**1974**	**1975**	**1976**	**1977**	**1978**	**1979**	**1980**	**1981**	**1982**
1	70	75	72	68	70	78	80	62	67
2	56	50	60	66	66	67	57	74	61
3	43	39	39	43	35	35	32	41	39
4	25	33	21	20	18	20	30	18	29

1974 - 1982 Average

Quartile	1	71%
	2	62
	3	38
	4	24

With almost no exceptions, the higher the earnings growth, the higher the price change. The only exception appears in 1981, when 62 percent of the stocks in the highest-growth quartile outperformed the median, while 74 percent of those in the second earnings growth-quartile did the same. Rainville produced further tables lending support to the proposition that high earnings growth goes with high stock price performance. This phenomenon suggested that earnings forecasts are very poor, that the market is constantly surprised by actual earnings growth. This conclusion suggested in turn some research on earnings growth estimates of analysts.

Rainville then examined the relationship not between actual earnings growth and price performance, but between analysts' estimates of growth and price performance. The following table summarizes results for 2,076 forecasts.

	ACTUAL		
PREDICTED	Top Half	Bottom Half	
Top Half	639 Cos. 11.6% price change	399 Cos. −12.3% price change	+2.4% price change
Bottom Half	399 Cos. 16.9% price change	639 Cos. −1% price change	+5.9% price change
	13.6% price change	−5.3% price change	

The table is divided horizontally into a top half, predicted to have the greater earnings growth, and a bottom half, predicted to have the lower earnings growth. The table is divided vertically into those that actually had above average growth and those that actually had below-average growth. Six hundred thirty-nine companies were predicted to be in the top half and were actually in the top half. An equal number were predicted to be in the bottom half and were actually in the bottom half. A much smaller number– 399 companies–were incorrectly predicted in each case.

The companies actually in the top half showed a 13.6 percent price change, while those actually in the bottom half showed a -5.3 percent price change. Those predicted to be in the top half showed a 2.4 percent price change, while those predicted to be in the bottom half showed a 5.9 percent price change. Two conclusions can be drawn from this table: First, the analysts performed fairly well in predicting relative earnings growth. Second, the price performance results were perverse: one would have made more money betting on the companies predicted to be in the bottom half. A number of participants commented that this conclusion verified a good deal of previous research.

TRANSACTION COSTS

71. INSTITUTIONAL TRADING COSTS
(Fall, 1984)

Eugene E. Record, Jr., Vice President, Thorndike, Doran, Paine and Lewis, introduced the transactions cost topic at the Fall, 1984 Seminar, recalling a number of earlier presentations at Q Group' seminars on active management, information coefficients, and the question of whether the value added by active management exceeds the transactions costs incurred to implement an active strategy. He also referred to an article in the *Wall Street Journal* on October 4, 1984 ("Fee War," on page 1), dealing with commission rates and transactions costs.

Gilbert L. Beebower, Senior Vice President, SEI Corporation, led off, recalling his presentation on the trading costs subject at the Spring, 1979 Q Group meeting in Santa Barbara. His work on transactions costs began in 1979 and has been continued over the years. The results he presented were based on an analysis of trades by up to sixteen organizations over the period July 1978 through June 1984. The statistics were aggregated by half-years, with the dollar amount of trades analyzed ranging from $7.9 billion in the second half of 1978 to $36.8 billion in the first half of 1984.

Data on commission costs alone indicated that for the past four years these have been quite stable for the institutions studied. On the buy side, commissions have been between 8 and 9 cents per share, representing about 25 basis points on the principal value of the transaction. On the sell side, the per-share commission rate has been a little higher, but still amounted to about 25 basis points. So one might generalize that the round-trip commission cost is about 50 basis points.

The results with respect to market impact costs were particularly interesting. In determining these costs, the trade price was compared to the closing price for the day, and then an adjustment was made for the price movement on the day following the day of trading. The reason for the adjustment was a suspicion that closing prices may be influenced by index fund trading, and to be sure of the market impact of a trade, one may have to look at price performance on the day following the trade. It turned out that this adjustment had only a very small effect on the results observed.

The first remarkable observation reported by Beebower was that for the sixteen subscribing organizations, buying appeared to have a generally negative impact on market prices, while selling seemed to have a generally positive impact. That is, prices generally rose after buy transactions had been executed and generally fell after sell transactions had been executed. This meant, of course, that the parties on the other sides of the trans actions undertaken by these sixteen institutions must have generally suffered a market impact in both buy and sell transactions. Among the sixteen institutions, the ones that had the lowest market impact cost on buys also tended to have the lowest market impact cost on sells. Similarly, there was some correlation across time of rankings by round-trip market impact costs. It appears that there are observable and consistent rankings of organizations in terms of the market impact costs of their transactions.

Thomas Loeb had presented evidence that transactions costs in buying and selling shares of small capitalization companies were very high. (Thomas F. Loeb, "Trading Cost: The Critical Link Between Investment Information and Results," *Financial Analysts Journal,* May/June, 1983.) Beebower, therefore, examined for trades in stocks of small capitalization companies the relationship between the market impact cost of transactions and the size of the trade as a percent of the company capitalization. Perhaps surprisingly, he discovered that the market impact cost for buys declines with the trade percent of capitalization. It turned out that for all buys the impact was negative (meaning that the price rose after the buy transaction) and that the price increase was greater when the transaction represented a larger percent of the company capitalization. For sells, the results were the converse. The price tended to fall after a sell trans action, and the larger the trade as a percent of company capitalization, the greater the decline in price.

A straight comparison of market impact cost against capitalization of the company whose stock was traded suggested that capitalization size had little effect on the cost for buys, at least in terms of cents per share. But since the average price of a low capitalization company was about a third of the average price of a high capitalization company, the cost as a percentage of the value of the trade declined from small to large capital ization stocks. For sell transactions, the picture was less clear. There was always a positive market impact cost (in contrast to the negative cost for buys), but it varied substantially, and followed no particular trend, with the capitalization of the stock traded.

A matrix combining a range of low to high capitalization and a range of low to high trade value as a percent of capitalization indicated no clear pattern in market impact cost. Finally, a comparison of trade price and the stock price twenty trading days later indicated that buy transactions generally worked out better than sell transactions. The inference Beebower drew was that buy transactions generally were based on useful information.

David G. Booth, President, Dimensional Fund Advisors, Inc., continued the presentation. His firm invests in companies with capitalizations below $100 million. He described some of the process by which brokers are selected and monitored for their ability to minimize market impact costs. Beebower's analysis, which includes Dimensional Fund Advisors as a participant, has produced results that are consistent with Booth's intuitive judgment of the quality of executions.

Booth described two types of trades undertaken by Dimensional Fund Advisors. Regular trades involve giving a broker market orders for no more than fifteen stocks at a time, and leaving it to the broker's discretion to handle the execution. Special trades constitute responses to broker inquiries. When offered a block of stock by a broker, Dimensional Fund Advisors makes use of a substantial data file it has assembled and will call the management of the company in question if there appears to be any doubt about the reason for the offering of a block of stock. Both types of trades

Both types of trades have worked well. The market impact costs for the regular trades have been slightly above zero and slightly above the median for the sixteen managers included in Beebower's study. The best brokers, in terms of minimizing market impact cost, have generally been third-market traders. For the special transaction the market impact cost has been substantially negative. In other words, the prices have tended to rise after the purchases were made. Booth attributed this result to the care exercised in these purchases, the reputation of Dimensional Fund Advisors as a buyer of small companies, which brings in many offerings, and the fact that those who are selling these stocks are frequently in a hurry and can be persuaded to take a significant price sacrifice.

72. CORE PORTFOLIO STRUCTURING/ REBALANCING STRATEGIES AND COSTS
(Fall, 1984)

Wayne H. Wagner, Vice President, Wilshire Associates, distributed a paper entitled "Package Trading."

Wagner began with a general discussion of the problem of massive trading to turn a large actively managed portfolio into a passive portfolio. Specifically, Wilshire was required to change a $1.4 billion portfolio containing 61 stocks into a passive portfolio holding 1,100 stocks. Over 58 million shares were to be traded.

The strategy chosen was to divide the trading into eight balanced packages of up to $185 million each, with one package put out for bids each week during December 1983 and January 1984. Each bidding broker was furnished with assurance with respect to liquidity of the stocks to be sold, but was not told either the names of the stocks or the precise time at which the trade would be called for. Wilshire selected the stocks to be included in a package, as well as the time for the execution, at random. When the list of stocks was furnished to the broker, the latter was required to complete the trade at prices to Wilshire equal to the "last" prices. In other words, Wilshire would pay and be charged the last prices before the list was received by the broker. Wagner explained in some detail the superiority of the "last" price rule to a closing price rule.

In reviewing results for the eight packages, Wagner pointed out that for all eight packages the brokers had suffered trading losses. (After commissions, the brokers had lost money on only the first two packages, and some brokers may have offset losses by option or futures hedging.) On average, the loss was 17 cents per share. The trading losses varied considerably from package to package, and did not seem to be correlated with market movement.

Wagner next demonstrated that the faster the broker carried out the executions, the smaller the losses. It was particularly damaging to execute the "easy" transactions first. That is, during a rising market a broker might be tempted, to his detriment, to execute the sells before the buys.

The market impact costs were also analyzed against five variables: the direction of the market during the trading period, the percent of volume represented by the transactions, the number of days taken to complete the transactions, the number of tickets written, and the capitalization of the companies whose stocks were traded. In general, the results were in accord with intuition: The more difficult the transaction, the greater the market impact cost.

There was considerable discussion of the similarities and differences between what Beebower had reported and what Wagner had described. Both studies suggested that a high market impact cost is associated with urgency in trading. The other parties to the trades included in Beebower's study, and the brokers in Wagner's study, were apparently acting under considerable time pressure and paid a significant market impact price. An interesting difference seemed to lie in the relative costs of buys and sells. Beebower's results had indicated more favorable market impact results for buys than for sells, while Wagner's data indicated that buys were more expensive for the brokers than sells. One explanation appeared to be that the institutions in Beebower's study were more anxious to complete sells than buys, and consequently did less well in terms of market impact. Wagner's brokers, on the other hand, may have felt a greater sense of urgency in buying than in selling.

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