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Tax Sensitive Investing in the Long Run:
Using a Simulation Environment to Quantify the Impacts of Different Investment Strategies

Paul R. Samuelson **1998 Northfield Converence**

Overview

This presentation addresses the important factors which impact after tax stock strategies. The innovation behind the presentation is a proprietary simulation program called *Taxable Portfolio Strategies Simulation Environment*™. Using *TPSSE,* one can quantify the impacts of different investment vehicles, investment strategies and market environments. Tax sensitive stock investing means reducing dividend income, accelerating tax losses and delay tax gains. Separate accounts provide significant benefits to investors who can immediately benefit from losses or have concentrated portfolios. However, mutual funds can be managed for the benefit of buy and hold investors with reduced income and minimal distributions of capital gains.

Key Elements of Current Practice

A quick review of current practice (in the first five pages of the presentation) provides a context for more precise comparisons of investment strategies in the simulation environment. For after tax investors *both* an asset's pattern of *price return* and distribution of *income* matter. Traditionally, individuals have sought price appreciation from stocks and reduced income, but have forgone much of the tax benefits of price appreciation by prematurely realizing capital gains. Investors with separate trust accounts have probably fared better than those with broker directed accounts, but managers of trust accounts review positions episodically, missing opportunities to realize losses and to reposition the portfolios to stocks with higher forecast returns.

Mutual fund investors have judged mutual fund returns on a pre-tax basis and have received poor after-tax returns. Index funds with low turnover have supplied better returns but still provide higher than optimal dividend distributions and episodic (and unnecessary) gain distributions. Although tax sensitive mutual funds are now being provided, their objectives and investment strategies to fulfill those objectives remain sub-optimal. Because investors are accustomed to ignoring the tax consequences of switching among funds, they continue to prematurely realize capital gains.

Essential Components of the *Taxable Portfolio Strategies Simulation Environment*™

One benefits from examining *reasonable* investment solutions in a simulation environment because current investment theory does not provide *optimal multi-period* solutions. While time and risk are familiar components of any investment problem, they interact in non-obvious ways when one addresses the *cumulative* impacts of different investment strategies and market conditions. The *Taxable Portfolio Strategies Simulation Environment*™ has several important features. First, the simulation program produces over a defined number of time periods many paths for portfolio returns. These paths are designed to capture the full range of portfolio outcomes and to reflect a realistic estimate of the average outcome. For each time period on each path, there is an appropriate range of individual stock returns (generated by a random number generator) because tax consequences can only be calculated based on individual stock returns not based on portfolio returns.

Second, the simulation program accommodates different actions taken by the portfolio manager. Some of these actions are motivated by actions outside the control of the portfolio manager, for example accommodating investor contributions and withdrawals. Other actions are motivated by the portfolio manager, such as selling stocks to realize losses and reinvesting in stocks to achieve diversification like that of the benchmark. The program translates strategies to achieve different tax objectives into specific algorithms to rebalance the portfolio. Simple assumptions are employed to capture the important features of after-tax investing without unnecessarily complicating the program. Because this particular version of the program does not incorporate stock forecasts, pre-tax portfolio returns are assumed to match those of the benchmark. For each time period on each path, individual tax lots are maintained and used in the calculation of all gains and losses on sales of stocks.

Third, the investment results for a given time period are accumulated across different paths using appropriate probabilities. The presentation provides graphs with the mean outcome (defined variously as after tax returns, losses and wealth) as well as the standard deviation of outcomes. Because these outcomes are not symmetric across high and low market returns, there are also high and low outcomes provided, representing outcomes at positive and negative one standard deviation. To realistically represent tax lots and transactions across many scenarios, there are many calculations and an enormous accumulation of records. Therefore, one should proceed with caution before one casually attempts to build from scratch such an environment.

First Solution for Tax Sensitive Investing: Modifying Forecasts

The presentation addresses five solutions for solving the complicated problem of maximizing after-tax returns. In each proposed solution, a simulation is run to demonstrate the quantitative impact of the solution. In the first solution (on page 7), portfolio managers need to modify their forecasts for individual stocks so that the forecasts can be used more effectively in managing a portfolio. Although revising tax exempt forecasts is a topic for another presentation, the essential modifications are two: first, to provide an appropriate tax penalty for dividend income and second, to increase the persistence of forecasts despite the sacrifice of forecast accuracy. Increasing the persistence of forecasts involves transforming certain factors to become more persistent (using longer trends in earnings revisions for example) and eliminating certain factors (or modifying them severely) which change direction too quickly.

Although the simulation program does not directly incorporate stock forecasts, a one-year simulation (shown on page 8) is performed in which two strategies are contrasted for an individual with a separate account (who can use tax losses to offset tax gains). In the first, all stocks are sold in a portfolio in which 20% of the market value of each stock represents unrealized capital gain. This strategy could represent the sale of stocks with unfavorable forecasts. At the end of a year, stocks with 10% unrealized losses are sold. In the second strategy, all stocks are initially held but sold selectively with sufficient losses at the end of the year. The after-tax return on the first strategy exceeds its pre-tax return despite the initial negative tax impact, because enough positions can be selectively sold after one year. However, the after-tax return on the second strategy is much more favorable because even with a 20% average gain, there are still substantial tax losses to be realized after one year. Essentially, over a short horizon the strategy of selling stocks with 20% gain and negative forecasts will be dominated by a strategy of retaining stocks and focusing on subsequent management of tax losses.

Second Solution: Use a Separate Account Instead of a Mutual Fund

When an individual can immediately use tax losses to offset gains, separate accounts represent a much better alternative to an optimally managed mutual fund. As shown on page 10 of the presentation, average after-tax returns over five years for a separate account will exceed pre-tax returns by several percent. There is a small difference when average returns are very high (and few losses can be realized) and a large difference when returns are very low (and more losses can be realized). Even if a mutual fund harvests losses in order to offset gains caused by fund withdrawals (not matched by contributions), the fund will occasionally make capital gain distributions. With higher returns, these gain distributions will be larger, creating a greater drag in comparison with after tax returns. However, after-tax mutual fund returns will more closely resemble after-tax separate account returns because the separate account will not be able to harvest many losses.

Third Solution: Diversify by Adding International Investments

International investments provide increased diversification (reducing the risks of pretax returns) and especially increase the after-tax returns of a separate account (where more losses can be selectively realized). A *global* mutual fund represents a *second best* solution, while a *combination of domestic and international* mutual funds represents a *third* best solution. In a global fund, contributions are more likely to offset fund withdrawals and more losses can be applied to gains realized resulting from fund withdrawals. Furthermore, investors in separate domestic and international funds are more likely to rebalance their allocations (for little expected pre-tax benefit) causing significant early realizations of gains (on their fund shares). A global separate account provides about 2% better average returns over five years than a global mutual fund (as shown on page 12 of the presentation), while a global fund provides a buy and hold investor at least ½% more than a combination of domestic and international funds.

Fourth Solution: Tailoring Separate Accounts Based on Unrealized Capital Gains

Managers of many separate taxable accounts have compelling practical obstacles to overcome in order to manage each account appropriately. Essentially, different accounts will hold different stocks with different unrealized gains, producing a range of pre-tax and after-tax performance. With concentrated portfolios (caused by large positions with significant unrealized gains), portfolio managers need to use specialized risk estimates, which directly address correlations of other securities with concentrated portfolio holdings. Adding an extra *portfolio* factor goes a long way toward more accurately defining which stocks provide diversification given the client's actual portfolio. Automating the steps required to rebalance portfolios (including sales and subsequent repurchases of stocks with unrealized losses), becomes the only way to practically deliver after-tax performance. If one begins with a concentrated portfolio, selling off positions with large unrealized gains will depress average returns over five years by 2%, without significant risk reduction (as shown on page 14). Using a model portfolio for taxable accounts will make pre-tax returns more similar but will sharply lower after-tax returns.

Fifth Solution: Adding Short Sales to Concentrated Accounts

Although clients may not be familiar with the approach, the most compelling way to diversify a concentrated portfolio and increase after-tax returns involves selling stocks in the same industry as concentrated stocks (increasing diversification) and selectively realizing capital losses on long and short positions (accelerating tax losses). The graph on page 16 demonstrates that after-tax benefits are large, increasing average returns by several percent over five years.

Conclusions

Separate accounts provide taxable investors with enormous advantages when they can immediately benefit from the realization of capital losses. Although the potential to realize losses declines sharply through time, after tax returns can significantly exceed pre-tax returns in the earlier years. There is an expected average benefit which is greater than that in the average market scenario. Furthermore, because more losses can be realized with low market returns, there can be substantial risk reduction associated with accelerated realization of losses. Unrealized gains accumulate sharply over time even with low market returns. Therefore, mature portfolios will have many "locked-in" positions, which will continue to contribute to portfolio performance even if partially offset with short positions in similar stocks.

The relationship between a client and her investment manager can benefit enormously from improved communications. The manager can demonstrate his value added to the client by accurately estimating the taxes saved through loss realization. The client can make better allocation decisions with more realistic expectations of after tax returns. Reallocations and withdrawals on one hand provide the potential for large realization of gains but on the other hand offer the manager the opportunity to sharply mitigate adverse tax impacts.

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Paul R. Samuelson

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Key Elements of Tax Sensitive Investing

- Asset Category
  - Price Return
  - Yield
- Investment Vehicle
  - Separate Account
  - Mutual Fund
- Investor Tax Status and Time Horizon
  - Tax Status of Investor and Current Portfolio
  - Timing of Withdrawals
  - Gifts

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Traditional Treatments of Key Elements

- Asset Category
  - Take Risk With Domestic Equities
  - Avoid Risk With Municipal Bonds
- Investment Vehicle
  - Separate Accounts for Very Rich or Very Foolish
  - Mutual Funds for Everyone Else
- Investor Tax Status and Time Horizon
  - Freeze Small Part of Portfolio and Realize Gains in Rest
  - Create Income to Meet Withdrawals
  - Reduce Risk in Retirement

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Obstacles Created by Clients to Efficient Tax Sensitive Investing

- Individual Stocks Are Sacred Investments or Broker's Playground
  - In Either Case Ignore Returns and Risk
- Judge Mutual Funds on Pre-tax Returns
  - Ignore Income and Gain Distributions
  - Fail to Anticipate Gain Realizations from Redeeming Shares
- Gifts are Episodic and not Systematic
  - Small Share of Gains are Avoided

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Obstacles Created by Traditional Managers

- Mutual Fund Managers Ignore -- and Therefore Maximize -- Taxes
- Brokers Trade as Much as They Can
- Trust Account Managers Consider Tax Consequences of Individual Trades
  - Episodic Comparison of Pairs of Securities Prevents Focus on Current Forecasts
  - Myopic View Creates Limited Diversification
  - Can't Calculate and Communicate After Tax Returns

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Obstacles for Institutional Managers

- Investment Processes Are Designed for Tax Exempt Investors
  - Investment Priorities Follow Client Revenues
- Accurate Forecasts Are Favored Over Persistent Forecasts
- High Premium is Placed on Consistency Across Accounts
- Single Period Horizon Fails to Capture Sequential Process

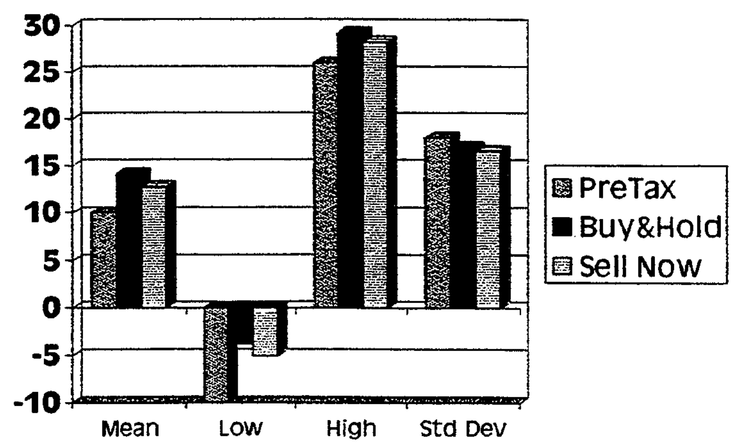
Examining Solutions Within A Simulation Environment

- Multiple Period Optimization is Beyond Current Investment Theory
  - But Reasonable Investment Strategies Can be Examined
- Consequences of Investment Decisions Accumulate Over Time
  - Ability to Harvest Losses and Avoid Gains Degrades with Time and Cumulative Portfolio Return
  - Timing of Withdrawals Have Large Consequences
- After Tax Returns Display Varying Degrees of Asymmetry over Different Horizons

First Solution: Modifying Forecasts for Tax Sensitive Investing

- Separately Measure Accuracy and Persistence of Factors
  - For Accuracy Compare Forecasts With Actual Returns
  - For Persistence Compare Forecasts With Past Forecasts
- Transform Factors to Improve Persistence
  - Use Longer Lags on Factors
- Recombine Transformed Factors
  - Less Accurate But More Useful Forecasts
- Taxes Can Be Examined Over Forecast Horizon

One Year After Tax Return from Selling Stocks With 20% Unrealized Gain



Second Solution: Use Separate Account Instead of Mutual Fund

- Separate Accounts Benefit From Realization and Distribution of Losses
- Mutual Funds Realize and Distribute Gains Caused by Redemptions
  - Even Low Turnover Funds Have to Realize Gains to Meet Redemptions
  - High Turnover Funds Distribute All Their Gains
- Mutual Funds Can Not Distribute Losses
  - Individuals Can Only Take Advantage of Average Loss by Selling Mutual Fund Shares

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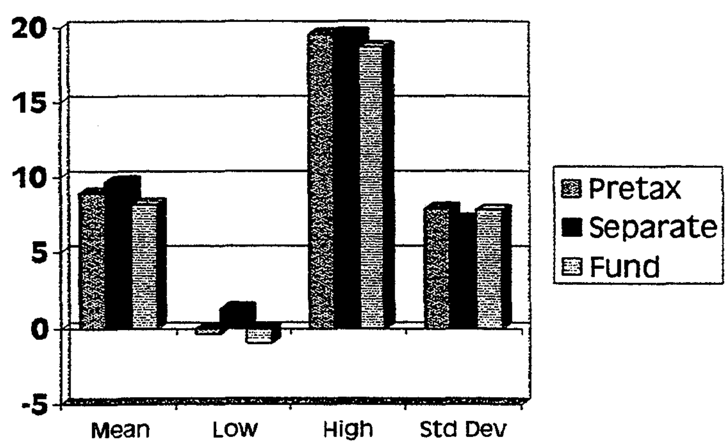
Five Year Average Returns of Domestic Separate Account and Mutual Fund



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Third Solution: Diversify by Adding International to Domestic Investments

- After Tax Returns on Separate Account Increase With Diversification of Individual Stocks
  - More Losses Can Be Realized When Some Markets Underperform Global Market
- Global Mutual Fund Provides Two Benefits Over Separate Domestic and International Funds:
  - In Combined Fund Redemptions Are More Often Matched by Contributions
  - Losses in International Fund Can Offset Gains in Domestic Fund

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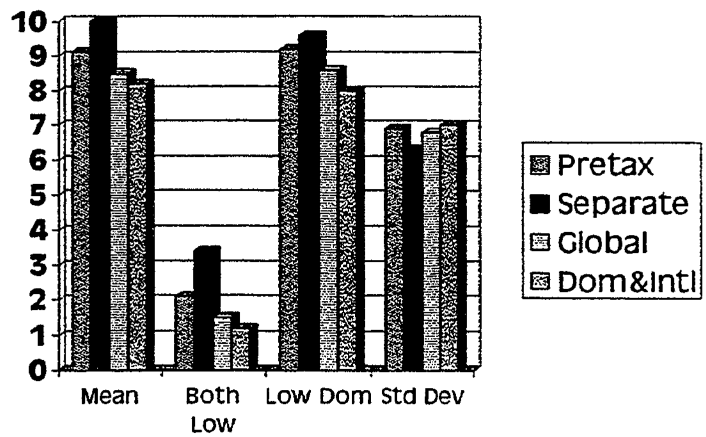
Five Year Average Returns With Separate Account, Global and Domestic & International Funds



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Fourth Solution: Tailor Accounts Based on Different Unrealized Gains

- Allow Concentrations in Particular Stocks With Low Costs
  - Relax Position Limits and Reduce Risk Aversion
  - Accurately Measure Covariances With Concentrated Holdings
- Automation of Portfolio Rebalancing is Critical
- Portfolios Can Share Similarities by Limiting List of Buy Candidates

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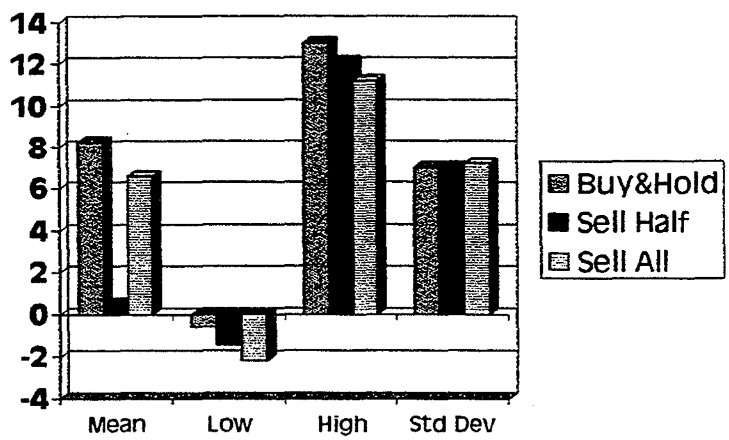
Five Year Average Returns With Concentrated Portfolio



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Fifth Solution: Add Short Sales to Concentrated Accounts

- Encourage Short Sales in Stocks in Same Industry as Concentrated Stocks
  - Reduce Risk Most Effectively
  - Focuses Return Differential
- Realize More Losses Under All Market Conditions
  - More Range of Individual Stock Returns
  - Many More Losses in Rising Market

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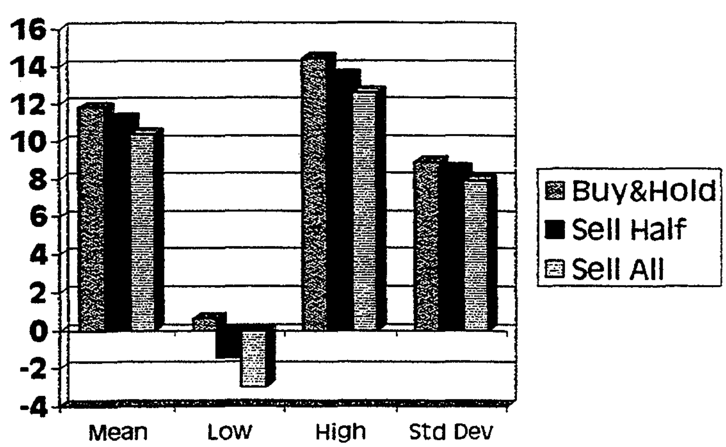
Five Year Average Returns With Concentrated Portfolio and Short Sales



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First Conclusion: Anticipate Consequences of Tax Management

- Potential to Realize Losses Declines Through Time
  - Declines Are Greater With High Portfolio Returns
- Average Benefit From Loss Realization Across Paths Exceeds Benefit From Average Path
  - Pattern is Inherently Asymmetric
  - Emphasize Reduction in Downside Risk Through Loss
- Unrealized Gains Accumulate Sharply Over Time
  - Significant Accumulations Even With Low Returns

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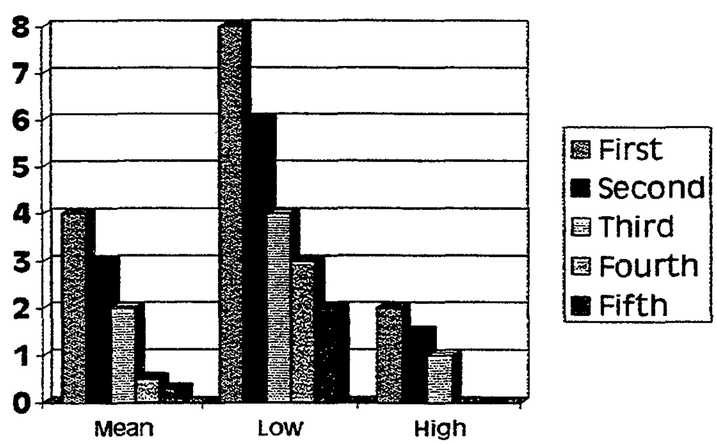
Losses Realized in First Five Years With Separate Account



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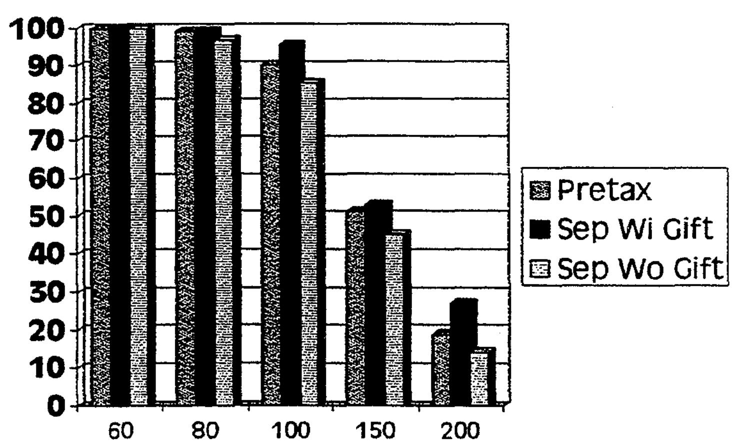
Second Conclusion: Communicate Better Benefits to Client

- Provide Accurate Measures of Taxes Saved Through Loss Realization
- Use After Tax Returns for Asset Allocation
- Supply Accurate Estimates of Savings Available From Efficient Reallocations
  - Compare to Proportional Sales of Current Holdings
- Give Realistic Estimates of Taxes Caused by Withdrawals

Cumulative Probabilities of Final Wealth After Five Years With and Without Gifts



Samuelson Portfolio Strategies LLC Offers Value Added Solutions

Various kinds of consultants can bring pieces of an investment solution to organizations. Samuelson Portfolio Strategies LLC organizes these pieces into genuine improvements to portfolio strategies. In addition, Paul R. Samuelson understands what is proprietary to an organization's investment process and will not violate an organization's trust in him.

Academic consultants often provide clever investment ideas but offer little support to internal staff in implementation. Samuelson uses his experience in all phases of portfolio management and his dedication to working with the firm's portfolio managers and research analysts to get ideas implemented.

Strategy consultants can provide information on industry trends and changes in client needs. Samuelson works with senior management to realistically assess what new portfolio strategies complement existing strategies and can be successfully implemented by current investment personnel.

There are many vendors of forecast factors and portfolio construction software. Samuelson helps evaluate and effectively use external forecasts. He finds better ways to feed portfolio optimization programs and easier ways to use their results.

Example: Many portfolio strategies do not fit well into off-the-shelf optimization programs. Strategies with multiple asset categories require custom risk estimates. Strategies with varying intensities of forecasts in different periods need multiple period solutions. Samuelson provides guidance in making optimizers solve the right problem and in accommodating investment views of portfolio managers.

Paul R. Samuelson's Background

Paul R. Samuelson has spent more than twenty years in the investment business including five years as a Consultant with Acadian Asset Management and fifteen years at investment management firms including Citibank's Investment Management Group, The Ford Foundation, Colonial Management Associates and Hagler, Mastrovita & Hewitt.

Samuelson recently left PanAgora Asset Management, where he was Chief Investment Officer, Director of US Equity and Fixed Income Strategies, and a member of the Board of Directors. He has been responsible for managing very large portfolios, working with important clients, selling to significant prospects, as well as supervising the construction and revision of Global Equity and Fixed Income strategies. He understands broad investment issues and the detailed steps required to build an investment strategy: including accessing data, creating forecasts, revising portfolios and attributing performance.

Samuelson has a Ph.D. in Finance and a M.S. in Management from MIT's Sloan School of Management, as well as a BA in English from Williams College. He lives outside Boston with his wife (who is also a consultant) and three sons.

Example: While senior investment managers are proud of their organization's proprietary investment ideas and processes, many recognize the need for discrete advice on how to achieve improvements. Samuelson Portfolio Strategies serves clients by focusing on their most important needs. Projects vary in scale, from small self-contained projects, such as investment strategy reviews, to large projects, such as the construction of new forecast models and investment strategies.

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The Mission of Samuelson Portfolio Strategies LLC

Samuelson Portfolio Strategies LLC was founded to translate good investment ideas into high performing portfolio strategies.

Most investment organizations can create better portfolio performance than they actually deliver to their clients. They have many good investment ideas but do not reflect them in their portfolio strategies. Clients are intrigued by the firm's investment ideas but disappointed by their portfolio's actual returns.

Paul R. Samuelson works with portfolio managers and research analysts to convert ideas into actions and better investment returns. Whether the problem resides in the strategy's forecasts, in the translation of the forecasts into portfolios or in the investment team, Samuelson can help identify the important steps to improve the portfolio strategy.

*Example: An enormous gap exists between common practice and best practice in managing taxable strategies. Samuelson has experience in managing taxable equity strategies, which deliver solid pretax **and** after tax returns. Samuelson Portfolio Strategies offers clients a proprietary simulation program called Taxable Portfolio Strategies Simulation Environment™. With TPSSE, clients can accurately calculate the costs and benefits of diversification, the advantages of separate accounts versus pooled funds and the after tax enhancements to returns from stock forecasts.*

Resources of Samuelson Portfolio Strategies LLC

Paul R. Samuelson, President and Founder of Samuelson Portfolio Strategies LLC, has spent his career building, maintaining and representing portfolio strategies. He understands what enables a strategy to work and what prevents strategies from achieving strong results. He has managed strategies involving all major asset categories, including global stocks, bonds and derivatives.

Samuelson also understands how people in an investment organization effectively deliver a portfolio strategy and the obstacles people face in achieving expected results. Over the last twenty years, he has worked for a large bank investment department, a plan sponsor, a mutual fund company and several investment boutiques. He has led many teams of portfolio managers and research analysts and works with an organization's existing staff to implement solutions.

To address significant client needs, Samuelson draws from a network of consultants who can make unique contributions to projects under his careful supervision. This network includes academic consultants with expertise in financial theory and estimation techniques, organization consultants with expertise in facilitating changes in individual and team behavior, and technical consultants with expertise in programming and software applications.

Example: Investment organizations periodically absorb new portfolio managers and research analysts. There are technical and organizational barriers to incorporating new portfolio managers' ideas into an existing investment process. Samuelson and his affiliated consultant have worked with people new to an organization to build successful portfolio strategies and to create successful relationships within the organization.