

Investment Advice from Mutual Fund Companies

Closer to the Talmud than to Markowitz.

Kenneth L. Fisher and Meir Statman

Like it or not, responsibility for investment decisions and the power to execute them are moving rapidly into the hands of relatively unsophisticated individual investors. As trust in the Social Security system diminishes, and defined-benefit plans give way to defined-contribution plans, individual investors struggle to understand their new responsibilities as they look to investment professionals for advice.

What advice do investors get? And how good is it? These are the questions that we address, with a focus on the portfolio advice of mutual fund companies.

Mutual fund companies design model portfolios and guide investors to portfolios that fit their needs. For example, the model portfolios by Vanguard range from an income portfolio of 20% cash, 60% bonds, and 20% stocks to a growth portfolio of 20% bonds and 80% stocks. We use two standards to assess the model portfolios of mutual fund companies: the Markowitz mean-variance standard and the ERISA standard. We find that model portfolios are consistent with the ERISA standard, but that they show no hint of either the form or the substance of the Markowitz mean-variance framework.

We discuss the portfolio advice of mutual fund companies against the backdrop of the move from defined benefits to defined contributions and the role that mutual funds play in that move.

FROM DEFINED BENEFITS TO DEFINED CONTRIBUTIONS

The new powers and responsibilities of individ-

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ual investors are largely a consequence of the move from defined-benefit pension plans to defined-contribution pension plans. Floyd Norris [1997] reports that the amount held in 401(k) accounts soared from \$55 billion in 1984 to \$750 billion in 1997, and that the amount in all defined-contribution plans has reached \$1.5 trillion, surpassing the \$1.4 trillion in defined-benefit plans.

Defined-benefit plans are paternalistic; employers play the role of parents, and employees play the role of children. Employees in defined-benefits plans are not asked to choose portfolios and live by the consequences of their choices; they need not care about the ups and downs of security markets. Employees in defined-benefits plans trade freedom of choice for security.

Eric Russell, a director of the Frank Russell Company, says that the move away from the security of defined benefits toward the freedom of defined contributions originated less in a desire of employees for freedom than in the inclination of employers to shed their paternalistic responsibilities. Leslie Wayne [1994] quotes Eric Russell as saying that 401(k) programs, a major component of defined-benefit plans, "offer employers a way to get off the liability hook for pension plans."

Russell worries that employees in defined-benefit plans do not understand the magnitude of the responsibility handed to them. So does Carter Beese, Jr., a commissioner of the SEC. Wayne quotes Beese as saying that "a lot of participants in 401(k) plans are not doing a good job. They are not investing well and leagues of them may be retiring at subsistence levels from their 401(k) plans."

The view that the move from defined benefits to defined contributions is nothing more than an attempt by corporations to shirk their responsibilities to their employees is overly unkind to corporations. As Bernstein [1997] writes:

It is not the paternalism from which they are trying to escape — it is the uncertainty of their future liabilities, or the uncertainty of the returns they must earn to meet those future liabilities. The whole process is just one more example of the fraying safety net that leaves each individual for himself.

There is no indication that the move from defined benefits to defined contributions and the breaching of the safety net will be reversed. Indeed, the

opposite is true, and the debate on the Social Security system provides a telling example. The Social Security system has many of the characteristics of a defined-benefits plan, and it covers almost all Americans. Plans for the future of the Social Security system are now a subject of vigorous debate, as many recommend that parts of the Social Security system be transformed into a defined-contributions plan.

MUTUAL FUNDS

Mutual funds have become central to the investment life of individual investors only recently. As Joseph Nocera [1994] writes, mutual funds were aimed at the money class, not the middle class, before the 1970s. Middle class people saw themselves as savers, not investors, and kept their money in bank savings accounts.

Money market funds appeared on the scene in the 1970s as a response to rapid inflation and the resistance of banks to paying interest rates reflecting that inflation. By 1982, 10 million households had money market funds. These households were younger and more typically middle class than their equity fund counterparts.

When individual retirement accounts went into effect in 1982, participants chose money market funds as their IRA vehicles; only 10% of IRA money went into equity mutual funds that year. Then mutual fund companies learned quickly how to introduce new IRA holders to equity mutual funds. Nocera describes how Fidelity touted the performance of Magellan in 1983 and promoted it as an IRA vehicle. By 1985, Fidelity held \$3.2 billion in equity IRAs, up from \$400 million in 1982.

The growth of mutual funds since 1982 has been phenomenal. The *1996 Mutual Fund Fact Book* reports that there were 539 stock and bond mutual funds in 1982, 1,071 in 1985, and 4,764 by 1995. Norris notes that mutual funds are now, by far, the most popular household investment vehicle. Americans have poured \$235 billion into mutual funds in 1996, up from \$22 billion in 1990. More than 63 million Americans owned shares in mutual funds in 1997, up from 38 million four years earlier.

Stock mutual funds are fast replacing direct holdings of stocks among individual investors. Patrick McGeehan [1996] notes that from 1990 to 1995, U.S. households added \$761 billion to their holdings of stock mutual funds while they reduced direct holdings of stocks by \$421 billion. Moreover, mutual funds

have taken the role of stocks as subjects of conversation and hot tips.

Magazines devoted to the concerns of individual investors such as *Money*, *Smart Money*, and *Worth* have proliferated. Much of the coverage in publications focuses on mutual funds. The magazine, *Mutual Funds*, is devoted entirely to the topic. The cover of its September 1996 issue screams, "The Next Magellan" and goes on, "Fidelity Magellan soared 1,302% in the past 15 years. Which funds will match that feat in the next 15? See page 36...."

The concerns of individual investors give mutual fund companies new roles beyond the provision of investment vehicles. Individual investors look to mutual fund companies for education and advice, especially on the selection of mutual funds and the construction of portfolios.

What is the nature of the advice given by mutual fund companies? And how good is it?

MEAN-VARIANCE PORTFOLIOS

A good reference point for advice on the construction of portfolios is the advice by Markowitz in his mean-variance framework. The mean-variance framework, presented in both a descriptive form and a prescriptive form, is the foundation of much of financial theory.

In the prescriptive form, investors are advised to regard variance as the proper measure of risk, to focus entirely on the expected returns and the variance of the overall portfolio, to prefer low variance over high variance and high expected returns over low expected returns. The mean-variance efficient frontier consists of portfolios with the highest expected returns for each possible level of variance.

Investors are advised to choose among portfolios on the efficient frontier according to their personal trade-off between expected returns and variance; investors with a high aversion to risk are advised to choose portfolios with lower variances and commensurately lower expected returns than investors with low aversion to risk. But the mean-variance framework provides investors neither with tools for assessing their attitudes toward the trade-off between risk and expected returns nor tools for judging the wisdom of their attitudes toward the trade-off.

While investors in the prescriptive form of the mean-variance framework are assumed to be in need of

advice about the mean-variance framework, investors in the descriptive form of the mean-variance framework are assumed to be born with the mean-variance framework already encoded in their decision processes; they may not be able to articulate the principles and processes of the mean-variance framework, but they have a keen intuition that leads them to the right portfolios, always on the efficient frontier.

Kritzman [1992] follows Markowitz on the prescriptive road as he advises individual investors to adopt the mean-variance framework for the construction of portfolios. He argues that institutional investors have already adopted the mean-variance framework and have recognized the crucial role of asset class selection in the performance of portfolios. Asset classes are available in the form of mutual funds, and Kritzman recommends that individual investors use mutual funds as building blocks in the construction of their portfolios.

Kritzman constructs six portfolios ranging from "safest" to "riskiest" on the mean-variance efficient frontier using realized returns from 1971 through 1990 for estimates of expected returns, variances, and covariances. He cautions that his numbers are estimates of future numbers, and that future numbers might well be different from past ones. The safest portfolio is 98% in cash and 2% in foreign stocks. The riskiest portfolio is 80% in large U.S. stocks, 10% in small U.S. stocks, and 10% in foreign stocks.

Kritzman's mean-variance optimization advice is the advice one is likely to hear from most finance academics and many finance practitioners — but how good is it? We offer two observations. First, we doubt that even today, when foreign stocks seem less foreign than they used to, will typical individual investors accept Kritzman's advice. Investors who are so concerned about safety that they put 98% of their assets in cash are not likely to put the other 2% in foreign stocks. Second, some of Kritzman's portfolios are not really mean-variance efficient portfolios. Consider first the 98% cash and 2% foreign stock portfolios.

Students new to the mean-variance framework never fail to be surprised by the fact that they can reduce the already low variance of an all-cash portfolio by adding to it some high-variance securities, such as foreign stocks. Here is a demonstration.

Consider five asset classes — the S&P 500 index for large U.S. stocks, the CRSP 6-10 for small U.S. stocks, the EAFE for foreign stocks, five-year government bonds for bonds, and thirty-day Treasury bills for

cash. Data on returns, standard deviations, and correlations over the period 1970-1994 are presented in Exhibit 1.

The mean annual return of a portfolio consisting entirely of cash is 7.05%, and its standard deviation is 2.79%. But the portfolio of 98% in cash and 2% in foreign stocks is better on both the expected returns and the standard deviation dimensions. Its expected return is higher, at 7.22%, than that of an all-cash portfolio, and its standard deviation is lower, at 2.65%, than that of an all-cash portfolio.

The central insight of Markowitz in the mean-variance framework is that the covariances between and among assets, not just the variances of the assets themselves, play a role in determination of the variance in the overall portfolio. The reduction in the standard deviation of the portfolio from the 2.79% of the all-cash portfolio to the 2.65% of the portfolio that combines cash with foreign stocks comes because the correlation between the two asset classes is low; indeed the correlation is negative at -0.225 .

The numbers in this example are estimates based on the realized returns over a particular period, 1970-1994, but the essence of the results does not depend in any crucial way on the quality of the 1970-1994 numbers as estimates of future numbers; the variance of a

portfolio that includes foreign stocks along with cash is lower than the variance of a portfolio composed entirely of cash for a wide range of numbers. The driving force behind the result is a low correlation between foreign stocks and cash, and that low correlation is a reality, not a mirage.

Kritzman's recommendation for a safest portfolio of 98% in cash and 2% in foreign stocks is consistent with the prescriptions of the mean-variance framework, but less consistent with the intuition of investors. Yet when it comes to the recommendation for the riskiest portfolio, Kritzman, in our view, prescribes a portfolio that is consistent with the intuition of investors, but that falls below the mean-variance efficient frontier.

An unstated element in Kritzman's analysis is that the percentage allocated to each asset class cannot fall below zero; that is, short sales are prohibited. Moreover, the percentage allocated to some asset classes is constrained not to exceed an arbitrary limit. In particular, the allocation to foreign stocks and the allocation to small stocks are set not to exceed 10% each. These constraints push portfolios below the efficient frontier.

To understand the effects of constraints on portfolio allocations, consider again the five asset classes. What is the composition of a mean-variance optimized portfolio with a standard deviation of 18%? The portfolio is described in Exhibit 2. It includes 38% in small U.S. stocks, 52% in foreign stocks, 170% in bonds, a 43% short position in large U.S. stocks, and a 117% short position in cash.

Now constrain the portfolio so that no short positions are allowed. Allocations change dramatically; the allocation to bonds falls from 170% to zero, and the allocation to large U.S. stock increases from a short position of 43% to a long position of 16%.

Last, constrain the portfolio, as Kritzman does, so that no short positions are allowed and so that the allocation to foreign stocks or small stocks cannot exceed 10%. Our equivalent to Kritzman's portfolio is identical to Kritzman's riskiest portfolio. It consists of 80% in large U.S. stocks, 10% in small U.S. stocks, and 10 percent in foreign stocks. The constrained portfolio has an expected return of 12.67%, while the constraint-free portfolio has an expected return of 15.64%. Constraints move the portfolio to a point approximately three percentage points below the mean-variance efficient frontier.

Many argue that placing constraints on the pro-

EXHIBIT 1
MEAN ANNUAL RETURNS, STANDARD
DEVIATIONS, AND CORRELATIONS
FOR FIVE ASSET CLASSES (1970-1994)

	Large U.S. Stocks (S&P 500)	Small U.S. Stocks (CRSP 6-10)	Foreign Stocks (EAFE)	Bonds (5-year Tsy. bonds)	Cash (30-day Tsy. bills)
Mean Annual Returns (%)	12.13	14.19	15.48	9.23	7.05
Std. Devs. (%)	15.90	24.09	23.35	6.98	2.79
Correlations:					
Large U.S. Stocks	1.000				
Small U.S. Stocks	0.814	1.000			
Foreign Stocks	0.565	0.444	1.000		
Bonds	0.370	0.179	0.052	1.000	
Cash	-0.004	-0.028	-0.225	0.242	1.000

EXHIBIT 2
EFFECT OF CONSTRAINTS ON ASSET ALLOCATION IN PORTFOLIOS WITH AN 18%
STANDARD DEVIATION OF ANNUAL RETURNS (1970-1994)

Asset Class	Allocation to Each Asset Class in a Mean-Variance Efficient Portfolio with No Constraints (%)	Allocation to Each Asset Class in a Mean-Variance Efficient Portfolio with No Short Positions (%)	Allocation to Each Asset Class in a Mean-Variance Efficient Portfolio with No Short Positions and with 10% Caps On Small U.S. Stocks and on Foreign Stocks (%)
Large U.S. Stocks	-43	16	80
Small U.S. Stocks	38	24	10
Foreign Stocks	52	54	10
Bonds	170	0	0
Cash	-117	6	0
Total	100	100	100
Mean Annual Return of the Portfolio (%)	15.64	14.14	12.67
Standard Deviation of the Portfolio (%)	18.00	18.00	18.00

portion of assets in the portfolio is only a remedy for errors in the estimation of the mean-variance parameters, not a violation of the prescriptions of the mean-variance framework. But this is not so. Green and Hollifield [1992] show that extreme asset positions, including short positions, are inherent in true mean-variance efficient portfolios; they are not just the result of errors in the estimation of mean-variance parameters.

BEHAVIORAL PORTFOLIOS

Investors who are reluctant to substitute 2% of their all-cash portfolios for foreign stocks, even though such substitution lowers the standard deviation of the portfolios while increasing the expected returns, are not the fully rational investors who are described in standard finance. Standard finance investors own a common mean-variance efficient portfolio, a portfolio that Tobin describes, and they tailor the common mean-variance efficient portfolios to their risk and expected return preferences by borrowing or lending.

The investors we describe are not rational investors; they are "normal" investors — we call them behavioral investors. Behavioral investors are also investors who insist that the proportion of foreign stocks or small U.S. stocks be capped at 10%. These examples of portfolio practices are described in Shefrin and Statman's [1995] behavioral portfolio theory.

A central feature of behavioral portfolio theory

is that investors view their portfolios not as a whole, as prescribed by Markowitz, but as distinct layers in a pyramid of assets, where layers are associated with particular goals, and where each layer has its own particular risks.¹ One layer, for example, might be a "downside protection" layer, designed to protect investors against becoming poor. Another might be an "upside potential" layer, designed to give investors a chance to become rich.

Investors can behave as if they hate risk in the downside protection layer, while they behave as if they thrive on risk in the upside potential layer. These are normal everyday investors, people who buy insurance policies while they also buy lottery tickets.

Mean-variance investors care only about risk and expected returns, but behavioral investors care about more than that. Behavioral investors hate the pain of regret that comes when portfolio choices turn out badly, and they use systems such as dollar cost-averaging to mitigate regret. Similarly, behavioral investors have imperfect self-control; they know the difficulty of saving when current consumption is tempting. Behavioral investors use devices such as payroll deductions and penalties for early withdrawals to assist in the task of self-control.

Shefrin and Statman [1995] offer behavioral portfolio theory as an alternative to the descriptive framework of mean-variance portfolio theory. But they offer no prescriptions. Some of the portfolio practices

described in behavioral portfolio theory are fundamentally protective, even if they deviate from mean-variance optimization. Other practices are not so helpful, and a prescription for change might be in order.

What are the portfolio prescriptions offered by mutual fund companies? And how helpful are they?

ERISA DIVERSIFICATION AND MARKOWITZ DIVERSIFICATION

Many mutual fund companies offer investors model portfolios, and they profess to guide investors in their choice among portfolios. Fidelity's model portfolios in the FundMatch brochure range from a 100% short-term portfolio, through a capital preservation portfolio, a moderate portfolio, and a wealth-building portfolio, to a 100% stock portfolio. Vanguard's model portfolios range from an income portfolio through a conservative growth portfolio, and a moderate growth portfolio to a growth portfolio (see Exhibit 3).

The brochures describing model portfolios commonly emphasize the importance of diversification in the construction of good portfolios. For example, the T. Rowe Price brochure begins by stating that "spreading your assets over a variety of different investments is perhaps the most important rule you can fol-

low," and concludes by warning against "putting all your eggs in one basket." The warning against putting all your eggs in one basket is revealing, because it was issued regularly long before Markowitz developed mean-variance portfolio theory; the idea that diversification is good investment practice preceded Markowitz by centuries, perhaps millennia.

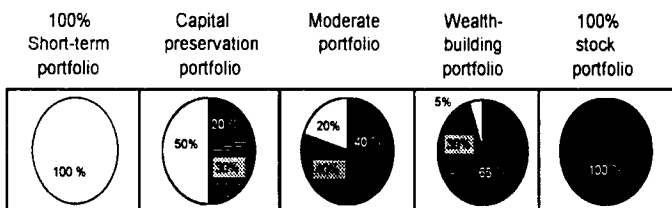
The earliest portfolio prescription we can find is almost two thousand years old. Meir Tamari [1987] quotes this following passage from the Talmud, "A man should always keep his wealth in three forms: one third in real estate, another in merchandise, and the remainder in liquid assets." Put the Talmudic three-asset portfolio in a pie chart, and it would not be much different from the portfolios recommended by Fidelity or Vanguard. Finance academics know Talmudic diversified portfolios as naively diversified portfolios.

Diversification is one of five general ERISA standards that apply to the discharge of a fiduciary's duty. ERISA diversification is naive diversification. In an interpretation of the diversification standard, *The Investment Advisor's Guide* [1987] notes that:

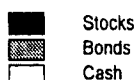
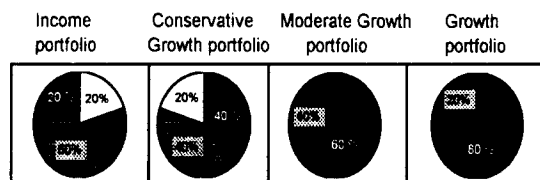
A fiduciary must diversify the investments of a plan so as to minimize the risk of large losses, unless under the circumstances it is clearly prudent not to do so.

EXHIBIT 3 MODEL PORTFOLIOS OF FIDELITY AND VANGUARD MUTUAL FUND COMPANIES

Fidelity model portfolios :



Vanguard model portfolios :



The Conference Report on ERISA states that the diversification standard may not be described in terms of a fixed percentage. Rather, a prudent fiduciary must consider the facts and circumstance of each case. The factors to be considered for diversification include 1) the purposes of the plan; 2) the amount of the plan assets; 3) financial and industrial conditions; 4) the type of investment, whether mortgages, bonds, or shares of stock, or otherwise; 5) distribution as to geographic location; 6) distribution as to industries; 7) the dates of maturity.

Markowitz is surely not the first to discover the benefits of diversification. His contribution is in drawing a distinction between naively diversified portfolios and mean-variance efficient diversified portfolios. But the diversification advice of mutual fund companies is much closer to naive diversification than to Markowitz diversification. T. Rowe Price advises investors to "diversify with three basic tools: stocks, bonds, and

cash." Any portfolio that combines the three assets is diversified. But neither T. Rowe Price nor any other mutual fund company mentions mean-variance portfolio theory, let alone claims that their model portfolios are on the mean-variance efficient frontier.

Some argue that mean-variance portfolio theory underlies the portfolio of mutual fund companies, and that mutual fund companies simply choose not to mention it in their marketing materials lest they complicate their presentations to unsophisticated individuals. For example, Kritzman writes that:

Individual investors are typically not conversant with the mathematical and theoretical underpinnings of asset allocation. The key challenge, therefore, is to present asset allocation in a way that appeals to an individual's intuition without compromising the integrity of the analysis. Asset allocation presentations must be purged of such cryptic jargon as correlation coefficient, covariance, standard deviation, stochastic process and utility function [1992, pp. 12-13].

We argue that model portfolios of mutual fund companies in fact cannot reasonably be described as portfolios constructed within the mean-variance framework. The integrity of the mean-variance analysis is most certainly compromised. Indeed, it is mean-variance analysis itself, not its cryptic jargon, that has been "purged" from the model portfolios of mutual fund companies.

The essence of the mean-variance framework is in an assessment of the risk and the expected return of a portfolio as a whole. But model portfolios of mutual funds are constructed not as a whole, but as layers in a pyramid of assets where the whole is obscured by the parts. (For a discussion of the goals of behavioral investors and the differences between their goals and mean-variance goals, see Fisher and Statman [1997].)

PORTFOLIOS AS PYRAMIDS

The picture of a portfolio as a pyramid of assets is common. Consider, for example, the advice in the brochure of the Putnam mutual fund company:

The Investment Pyramid lists Putnam funds by investment category — e.g., tax-free income,

growth and income, and growth. Putnam's income and tax-free funds offer lower reward potential with lower investment risk. Growth and income funds provide greater reward potential with more risk. At the top of the pyramid are growth funds. These funds offer the greatest growth potential with the highest level of risk.

The labels of the layers of the portfolio — income, tax-free, growth and income, and growth of the portfolio — designate the goals (see Exhibit 4). The Putnam brochure goes on to describe the link between assets and goals; the goal of bonds is income, while the goal of stocks is growth.

The pyramid portfolio is built in two distinct steps. The first step consists of allocating the total of the portfolio among asset classes. An allocation might be 20% to income funds, 20% to tax-free funds, 30% to growth and income funds, and 30% to growth funds. The second step consists of finding a specific mutual fund for each layer: perhaps the High Yield Trust for the income layer, the Municipal Income Fund for the tax-free layer, the Balanced Retirement Fund for the growth and income layer, and the Asian Pacific Growth Fund for the growth layer.

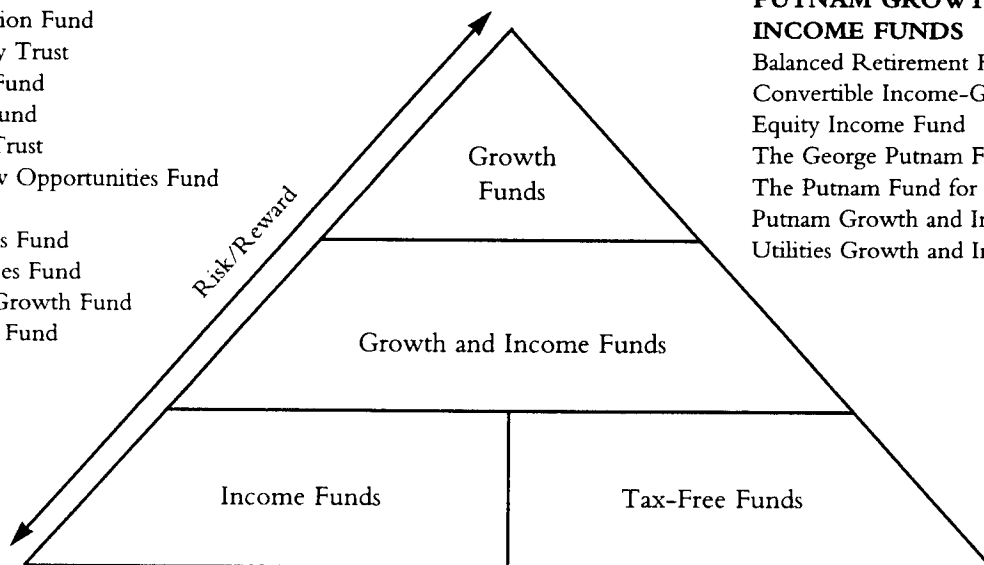
Even if the first step of the pyramid construction is consistent with mean-variance optimization, the two-step pyramid construction process leads to suboptimal portfolios because it ignores covariances between assets in the various layers of the pyramid. The pyramid construction process provides no way of accounting for the fact that the covariance between the Asian Pacific Growth Fund, chosen for the growth layer, and the High Yield Trust, chosen for the income layer, is different from the covariance between another fund in the growth layer, such as the Vista Fund, and the High Yield Trust. The combination of the Asian Pacific Growth Fund and High Yield Trust is likely to provide a different standard deviation and expected return from the combination of the Vista Fund and High Yield Trust. One combination might be suboptimal relative to the other, and both are likely to be suboptimal relative to the mean-variance efficient frontier.

The Fidelity FundMatch brochure includes a set of questions designed to help investors construct portfolios. Each answer is assigned points, and the total number of points guides investors toward correspond-

EXHIBIT 4
THE INVESTMENT PYRAMID BY PUTNAM

PUTNAM GROWTH FUNDS

Asia Pacific Growth Fund
 Capital Appreciation Fund
 Diversified Equity Trust
 Europe Growth Fund
 Global Growth Fund
 Health Sciences Trust
 International New Opportunities Fund
 Investors Fund
 Natural Resources Fund
 New Opportunities Fund
 OTC Emerging Growth Fund
 Overseas Growth Fund
 Vista Fund
 Voyager Fund
 Voyager Fund II



PUTNAM GROWTH AND INCOME FUNDS

Balanced Retirement Fund
 Convertible Income-Growth Trust
 Equity Income Fund
 The George Putnam Fund of Boston
 The Putnam Fund for Growth and Income
 Putnam Growth and Income Fund II
 Utilities Growth and Income Fund

PUTNAM INCOME FUNDS

Adjustable Rate U.S. Government Fund
 American Government Income Fund
 Diversified Income Trust
 Federal Income Trust
 Global Governmental Income Trust
 High Yield Advantage Fund
 High Yield Trust
 Income Fund
 Intermediate U.S. Government Income Fund
 Money Market Fund
 Preferred Income Fund
 U.S. Government Income Trust

PUTNAM TAX-FREE FUNDS

Intermediate Tax Exempt Fund
 Municipal Income Fund
 Tax Exempt Income Fund
 Tax-Free High Yield Fund
 Tax-Free Insured Fund
 State tax-free income funds*
 State tax-free money-market funds*

ing portfolios, from a capital preservation portfolio for investors with zero to 75 points to a 100% stock portfolio for investors with 180 or more points.

The tendency to consider risk layer by layer in a pyramid of assets, rather than in the portfolio as a whole, is illustrated in Question 10 of Fidelity FundMatch:

3. Be willing to take *a little more risk* with *all* your money. (10 points)
4. Be willing to take *a little more risk* with *some* of your money. (5 points)
5. Be unlikely to take much more risk. (2 points)

If you could increase your chances of improving your returns by taking more risk, would you:

1. Be willing to take *a lot more risk* with *all* your money. (16 points)
2. Be willing to take *a lot more risk* with *some* of your money. (12 points)

Answers 1 and 3 make sense within the mean-variance framework. In that framework, only the risk of the overall portfolio (i.e., *all* your money) matters. But answers 2 and 4 make no sense within the mean-variance framework. This is because answers 2 and 4 segment the portfolio into layers where investors are willing to take *a lot more risk* or *a little more risk* with *some* of

their money. Mean-variance investors have a single attitude toward risk, not a set of attitudes, layer by layer.

Mutual fund investors are not unique as they construct portfolios as pyramids, and they are not unique as they end up below the mean-variance efficient frontier because they ignore covariances between assets. Jorion [1994] notes that institutional investors who manage global portfolios often delegate the management of currency to "overlay" managers who use currency futures and forwards to minimize the risks or maximize the returns of the underlying asset portfolios.

The proper mean-variance way to approach currency management is through a joint optimization over all assets, where assets include stocks and bonds as well as currencies. The overlay structure deviates from the proper mean-variance way in that it involves a two-step optimization, not a joint optimization. Jorion shows that the two-step portfolios are suboptimal relative to mean-variance efficient portfolios, because they ignore covariances between assets in the underlying portfolio and currencies. He estimates the efficiency loss relative to the mean-variance efficient frontier at 40 basis points per year.

The tendency to build portfolios as pyramids, layer by layer, linking layers to particular goals, and ignoring covariance between layers is evident in the advice of many mutual fund companies. The advice also highlights another feature of behavioral portfolios, the role played by the investment time horizon.

RISK AND INVESTMENT TIME HORIZON

Is risk dependent on the investment time horizon? Some, such as Samuelson [1994], argue that the allocation to the risky asset should be independent of the investment time horizon. Others, such as Leibowitz and Langetieg [1989], argue that the allocation to the risky asset should be higher for long investment time horizons.

Time horizon is not always *explicit* in the mean-variance framework, but it is always *implicit* in it. The mean-variance framework calls for an allocation to the risky asset that varies with the investment time horizon, but the relationship between risk and the investment time horizon in the mean-variance framework corresponds neither to the Samuelson position nor to the Leibowitz and Langetieg position. Thorley [1995] shows that the mean-variance framework calls for less of an allocation to the risky asset when the investment

time horizon is long than when it is short. So if the risk aversion of an investor in the mean-variance framework leads her to a 60% allocation to the risky asset in a one-year horizon portfolio, the same risk aversion leads her to only an 11% allocation to the risky asset in a ten-year horizon portfolio.

Mutual fund companies have no use for the mean-variance based advice or for Samuelson's advice as they form their model portfolios. They are clearly in the Leibowitz and Langetieg camp. For example, the Fidelity FundMatch advises investors with horizons shorter than two years to disregard all other considerations and invest their portfolios entirely in cash.

The issue of risk and the investment time horizon involves more than determining the relationship between the two. This is because investors think about the investment time horizon not as one time horizon but as a set of time horizons. One time horizon might be for college education for the children, one for the purchase of a vacation home, and one for retirement. T. Rowe Price advises investors explicitly to build their portfolios as layers in a pyramid, each layer with its own investment time horizon, goals, and risk stance.

T. Rowe Price proposes five model investment strategies, each of which we regard as a layer in an overall portfolio pyramid. Strategy 1 calls for a layer composed of 25% in stocks, 40% in bonds, and 35% in cash. The brochure describes strategy 1 as a relatively low-risk strategy that emphasizes bonds and money market investments; the goal of stocks in strategy 1 is to protect the value of the portfolio from the effects of inflation. In contrast, strategy 5 calls for an all-stock layer. The brochure describes strategy 5 as one designed for very aggressive investors with long time horizons who are willing to accept a "bumpy ride" in return for a potential for the best results.

T. Rowe Price *constructs* the overall portfolio as a combination of layers, each with its own time horizon, goals, and attitude toward risk. There is nothing to indicate that the firm considers the covariances between the layers. Indeed, its method of portfolio construction virtually guarantees that covariances between the layers will be ignored.

MEASURES OF RISK AND ATTITUDES TOWARD RISK

The mean-variance framework advises investors to regard variance of returns in the overall

portfolios as the one and only measure of risk. But it offers investors neither guidance about assessing their attitudes toward risk nor guidance about assessing the trade-off between risk and expected returns. Mutual fund companies, in contrast, ignore variance as a measure of risk, replacing it with other measures. Mutual fund companies do guide investors in the identification of their attitudes toward risk and in matching their attitudes with specific portfolios. Consider again the Fidelity FundMatch.

Questions 7-10 in the FundMatch come under the heading, "What is your attitude toward risk?" Question 8 asks, "Have you ever invested in individual stocks or stock mutual funds?" FundMatch offers four possible answers to this question, and specifies the number of points awarded to each.

1. No, and I would be uncomfortable with the risk if I did. (1 point)
2. No, but I would be comfortable with the risk if I did. (15 points)
3. Yes, but I was uncomfortable with the risk. (3 points)
4. Yes, and I felt comfortable with the risk. (16 points)

Note that there is no attempt in the FundMatch to define risk, let alone quantify it as either variance or some other specific measure. Note also the link that the FundMatch draws between familiarity and perceptions of risk. Answers 1 and 3 are identical in that the answer is "uncomfortable with the risk." Yet the investor in answer 3 is familiar with stocks, while the investor in answer 1 is not. Familiarity seems to lower aversion to risk; answer 3 comes with more points than answer 1.

The association between familiarity and aversion to risk is common. It underlies the "home bias," the tendency of American investors to overweight the proportion of American stocks in their portfolios and of the Japanese to overweight Japanese stocks in theirs. The home bias is not as pronounced now as it used to be. Americans are now more familiar with foreign stocks than they once were. But the perception that foreign stocks are more risky than domestic stocks has not disappeared completely.

For example, the Fidelity FundMatch classifies a foreign stock fund as the least conservative among a group of stock funds, adding that:

Foreign investments involve risks that are in addition to those of U.S. investments, including political and economic risks, as well as the risk of currency fluctuations. These risks may be magnified in emerging markets.

The Fidelity FundMatch characterization of the risk of foreign investments is consistent with the behavioral framework in which risk is assessed layer by layer, but the characterization is not consistent with the mean-variance framework in which only the overall risk of the portfolio matters. Specifically, the FundMatch does not mention the covariance between foreign investments and domestic investments and the contribution of the low covariance between the two to a reduction in the overall risk of the portfolio.

Home bias is quite evident in the portfolio allocations recommended by mutual fund companies. For example, the allocation to foreign stocks in Vanguard's model portfolios ranges from zero to 15%. Charles Schwab's model portfolios call for a greater allocation to foreign stocks than the model portfolios of any other mutual fund company. The allocation in the Schwab model portfolios ranges from 5% in the conservative plan to 30% in the aggressive plan. Even in the aggressive plan, however, more than two-thirds of the portfolio is allocated to U.S. stocks. Of course, the market value of U.S. stocks is considerably less than two-thirds of all stocks.

The Charles Schwab Mutual Fund Selection Planner questionnaire is similar in many aspects to the Fidelity FundMatch questionnaire. For example, it ascribes higher risk tolerance to those with investment experience, although it uses different questions to infer attitudes toward risk. For example, it draws a link between automobile insurance and attitudes toward risk in investment portfolios. Those who choose to carry no insurance at all are assumed to have the highest tolerance for investment risk.

Mutual fund companies that use questionnaires to ascertain investor attitudes toward risk do not rely on attitudes alone; they also consider "objective" data on the financial conditions and needs of investors. For example, the Charles Schwab questionnaire asks about income. Schwab recommends that investors who expect declining or variable income assume less risk than investors who expect increases in income. Similarly, Schwab recommends that older investors assume less risk than younger investors.

Some mutual funds dispense entirely with questionnaires in assessing the capacity of investors to bear risk, replacing them with a choice from investor "profiles." Consider this investor profile from "How To Invest Wisely," by Stein Roe & Farnham:

You want to build wealth. You're planning a large purchase that's going to take a substantial amount of money, and you want to be sure that you have enough when the time is right. Your kids will go to college, though that still seems a long time away, and you want to have something to retire on after your hard work. You have time and you want to use it.

And here is the recommended portfolio:

Your investment profile indicates that you're well suited to growth investing. You're willing to risk fluctuations in stock market prices for higher return potential, so 40% of your portfolio will go to Stock Fund and 25% to Special Fund. To provide income and capital preservation, we suggest you diversify by investing 15% in either Intermediate Bond Fund or Managed Municipals. For the remainder of your portfolio, keep 5% in either Cash Reserves or Municipal Money Market Fund, depending on whether tax-free investing suits you.

Note the pyramid structure in the Stein Roe & Farnham portfolio; particular assets are associated with particular goals. For example, bonds are in the portfolios to "provide income and capital preservation."

SAVINGS AND SELF-CONTROL

Saving for a distant future when current consumption is so tempting is difficult. It is hard to give up a fast new car today in exchange for a promise of a better retirement, when retirement is so far away. Self-control is required if the temptations of current consumption are to be overcome.

Rational investors, the ones described in standard finance, have no self-control difficulties; when they want to consume, they consume, and when they want to save, they save. Behavioral investors, however, find self-control difficult, and they use a variety of tools

to enforce it. Many of the tools are provided by the government, directly or indirectly. Social Security is a prominent example; it enforces payments in return for a promise of payoff at retirement. Most Americans are required to participate in the Social Security system, whether they like it or not. Tax incentives for savings in 401(k) and IRA plans and penalties for early withdrawals are another example.

Mutual fund companies help investors bolster their self-control by highlighting retirement needs so that future needs are not eclipsed by the desire for current consumption. The Oppenheimer mutual fund company highlights retirement needs in its "American Tragedy, American Dream" brochure. Here is how it begins:

The American dream of a comfortable, secure retirement is in danger of becoming an American tragedy. Never before have so many people been so unprepared for such a formidable responsibility.

The brochure goes on to describe the dangers to secure retirement income posed by inflation, likely erosion of Social Security benefits, the decline in corporate benefits, and the temptations of life-styles that emphasize current consumption.

Oppenheimer advises investors to take charge of their future by planning and saving. And it provides a step-by-step worksheet to calculate the savings needed for retirement. For example, a married forty-five-year-old who plans to retire at age sixty-five needs to save \$21,948 per year if he or she has current savings of \$100,000, expects an 8% per year return on savings, and desires an annual retirement income of \$80,000.

Worksheets by other mutual funds reach different numbers. For example, the same forty-five-year-old is advised to save \$37,466 per year if he or she follows the worksheet in the MFS brochure, "Retirement Planning is No Game." The variation in savings estimates by mutual fund companies is due to variation in assumptions about Social Security benefits, inflation, and other factors. Similar differences are reported by O'Connell [1996].

Imperfect as they are, the worksheets perform an important task. They highlight the need for retirement income and bolster self-control as they provide a plan for reaching that income.

MUTUAL FUND MODEL PORTFOLIOS AND THE EFFICIENT FRONTIER

Markowitz [1984] draws the line that separates the normative (prescriptive) mean-variance theory that he has developed for the positive (descriptive) theories of asset pricing, such as the capital asset pricing model. Expected returns on securities in the CAPM cannot exceed levels determined by risk, and risk, in the CAPM, is determined by beta. But expected returns in the mean-variance framework can take any value that an investor chooses to assign to them. So while the CAPM leads to a single efficient frontier, mean-variance theory can lead to as many efficient frontiers as there are investors, since each investor might assign different values to expected returns, variances, and covariances.

Actually, not even the CAPM leads to a single efficient frontier. This is because the location of the efficient frontier depends crucially on a precise measurement of the market portfolio and on a precise measurement of the beta of each security. This is an impossible task. If the measured market portfolio is different from the true market portfolio, betas are biased, and so are expected returns. The consequences of these biases are significant because even small differences in expected returns, variances, and covariances can lead to large differences in the placement of the efficient frontier.

Jorion constructs a mean-variance efficient frontier with expected returns, variance, and covariance equal to historical averages. He finds that institutional portfolios are approximately 40 basis points below the efficient frontier. Do mutual fund investors who follow model portfolios offered by mutual fund companies end up with portfolios that lie below the efficient frontier? And if so, by how much?

The Charles Schwab Mutual Fund Selection Planner offers five model portfolios ranging from a conservative plan to an aggressive plan. The conservative plan is designed for "investors who want current income and a high degree of stability." It is composed of 15% in large U.S. stocks, 5% in international stocks, 55% in bonds, and 25% in cash. The aggressive plan is designed for "long-term investors who want high growth and who don't need current income." It is composed of 40% in large U.S. stocks, 25% in small U.S. stocks, 30% in international stocks, 5% in cash, and no bonds.²

The Charles Schwab model portfolios provide a good case for analysis because the firm is specific about

the data that underlie the model portfolios. The Schwab brochure specifies that the returns data are for the years 1970-1994, taken from Ibbotson Associates' ENCORR/OPTIMIZER, 1994. The ENCORR/OPTIMIZER is a mean-variance optimization program, but the Schwab brochure does not say whether this or any other mean-variance program has been used in the construction of the model portfolios, or whether averages over the period 1970-1994 have been used as estimates of the mean-variance parameters.

Assume that we take the averages over the period 1970-1994 as estimates of the mean-variance parameters. We ask two questions: First, how close are the allocations in the Schwab model portfolios to the allocations in mean-variance efficient portfolios with the same standard deviations? Second, how far from the efficient frontier are the Schwab model portfolios? Since short positions in mutual funds are difficult to implement, we constrain portfolios to have only long positions.

The differences between asset allocation in the Schwab model portfolio and asset allocation in the mean-variance portfolios with the same standard deviations are substantial. For example, while the Schwab conservative plan calls for an allocation of 15% to large U.S. stocks, the mean-variance efficient portfolio with the same standard deviation calls for zero allocation to large U.S. stocks. Similarly, while the Schwab aggressive plan calls for an allocation of 40% to large U.S. stocks, the mean-variance efficient portfolio with the same standard deviation calls for an allocation of only 15% (see Exhibits 5 and 6).

The large differences in allocations between the Schwab model portfolio and mean-variance portfolio correspond to fairly small differences in expected returns. The difference between the Schwab model portfolios and mean-variance portfolios ranges from a low of 20 basis points per year for the aggressive plan to 53 basis points per year for the moderate plan. These figures are quite similar to the 40-basis point figure reported by Jorion [1994] in his study of institutional portfolios.

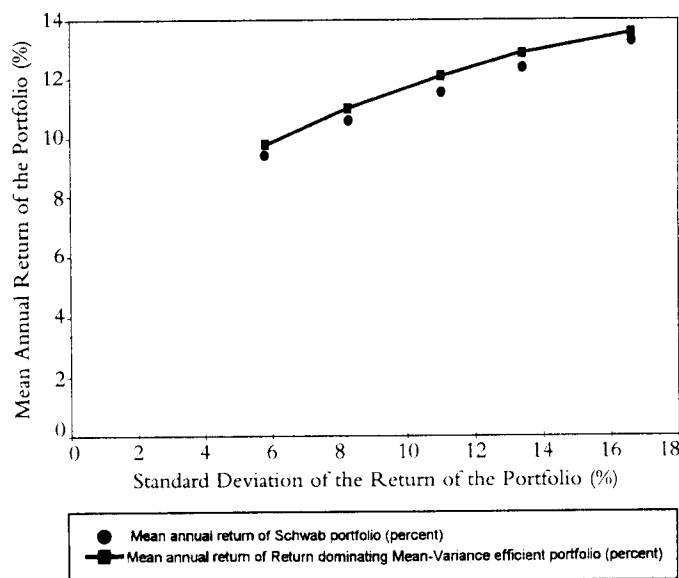
CONCLUSION

In the new world of Wall Street, access to individual investors — clients who were once sneered at by the professionals — is now viewed as the key to success and the blueblood investment firms feel they must have it.

EXHIBIT 5 CHARLES SCHWAB MODEL PORTFOLIOS AND DOMINATING MEAN-VARIANCE EFFICIENT PORTFOLIOS (1970-1994) (%)

Asset Class	Allocation to Each Asset Class (percent)															
	Conservative Portfolio				Moderately Conservative Portfolio				Moderate Portfolio				Aggressive Portfolio			
	Difference Between the Schwab and the				Return-Dominating Mean-Variance Efficient Portfolio				Difference Between the Schwab and the				Return-Dominating Mean-Variance Efficient Portfolio			
	Schwab Portfolio	Return-Dominating Mean-Variance Efficient Portfolio	Difference Between the Schwab and the	Return-Dominating Mean-Variance Efficient Portfolio	Schwab Portfolio	Return-Dominating Mean-Variance Efficient Portfolio	Difference Between the Schwab and the	Return-Dominating Mean-Variance Efficient Portfolio	Schwab Portfolio	Return-Dominating Mean-Variance Efficient Portfolio	Difference Between the Schwab and the	Return-Dominating Mean-Variance Efficient Portfolio	Schwab Portfolio	Return-Dominating Mean-Variance Efficient Portfolio	Difference Between the Schwab and the	
Large U.S. Stocks	15	0	-15	20	0	-20	30	0	-30	35	0	-35	40	15	-25	
Small U.S. Stocks	0	5	5	10	8	-2	15	15	0	20	20	0	25	22	-3	
Foreign Stocks	5	16	11	10	22	12	15	34	19	20	43	23	30	50	20	
Bonds	55	47	-8	45	69	23	30	51	21	20	37	17	0	0	0	
Cash	25	32	7	15	1	-13	10	0	-10	5	0	-5	5	13	8	
Total	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	
Mean Annual Return of the Portfolio	9.43	9.78	0.35	10.60	10.99	0.39	11.56	12.09	0.53	12.38	12.90	0.52	13.40	13.60	0.20	
Std. Dev. of the Return of the Portfolio	5.80	5.80	0.00	8.26	8.26	0.00	11.02	11.02	0.00	13.40	13.40	0.00	16.60	16.60	0.00	

EXHIBIT 6 CHARLES SCHWAB MODEL PORTFOLIOS AND DOMINATING MEAN-VARIANCE EFFICIENT PORTFOLIOS (1970-1994)



This is how Norris [1997] assesses the merger between Morgan Stanley and Dean Witter. Individual investors have new powers, but with the new powers come new responsibilities.

As the world of defined-benefit plans gives way to the world of defined-contribution plans, and as confidence in the viability of the Social Security system fades, individuals are handed direct responsibilities for their financial future. Many entities have stepped in to help individual investors. They include brokers, financial planners, money managers, employers, mutual fund companies, college professors, and journalists. We focus here on the portfolio advice of mutual fund companies.

We have two sets of standards by which to evaluate the portfolio advice of mutual fund companies. One is the set of ERISA standards, and the other is the set of Markowitz mean-variance standards. ERISA standards call for fiduciaries to be prudent. A prudent fiduciary must act with the skill of someone "in a like capacity and familiar with such matters."

The fiduciary standard gives fiduciaries considerable latitude in the construction of portfolios. An allocation of 23% of assets to a single loan is likely to be judged imprudent. So would be an allocation of 90% to residential real estate mortgages. But the Department of Labor places no limitations on the percentage of a portfolio's assets that may be invested in

shares of mutual funds. ERISA standards are easy to meet with portfolios of mutual funds, and the portfolio advice of mutual fund companies is surely compatible with the ERISA boundaries.

Mutual fund companies frame portfolios as layered pyramids of mutual funds in which layers correspond to particular goals, time horizons, and attitudes toward risk. They advise investors to identify investment goals, such as college education or retirement, associate these goals with investment time horizons and with attitudes toward risk, and choose mutual funds that are consistent with these goals.

Mutual fund companies offer investors diversified portfolios, and they all extol the benefits of diversification, but they have little use for the mean-variance framework. The diversification that mutual fund companies offer is "naive" diversification of the "don't put all your eggs in one basket" variety, not diversification that takes investors to the mean-variance efficient frontier.

Investors in the mean-variance framework consider the portfolio as a whole, taking into account only

the variance and expected returns of the overall portfolio. There is no hint of this mean-variance principle in the advice of mutual fund companies. Model portfolios of mutual fund companies are actually constructed as layers in a pyramid of assets in which each layer is evaluated in isolation from the overall portfolio, so that covariances between layers are ignored.

Mutual fund companies not only ignore the prescription of the mean-variance framework, but they also offer prescriptions where the mean-variance framework offers none. The mean-variance framework advises investors to choose portfolios on the mean-variance efficient frontier according to their personal trade-offs between risk and expected returns. But it offers investors no guidance as to how they might determine their attitudes toward risk and expected returns, or how they might judge the wisdom of their attitudes.

Mutual fund companies by contrast use questionnaires and investor "profiles" as tools to help investors assess their attitudes toward risk and to match their attitudes with portfolios. Moreover, mutual fund companies offer investors help where, according to

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standard financial theory, no need exists. Standard finance theory assumes that investors exercise perfect self-control as they allocate resources between current consumption and savings. But mutual fund companies know that perfect self-control is rare, so they use retirement plans as tools to help investors bolster the self-control needed for savings when current consumption is so tempting.

It turns out that the costs of ignoring the prescriptions of the mean-variance framework are small. We estimate that model portfolios by Charles Schwab are approximately 20-53 basis points below the mean-variance efficient frontier. This calculation is based on estimates of expected returns, estimates that are surely imperfect. Given the imperfection that always plagues estimates, we consider the 20-53 basis point distance indistinguishable from zero.

The small distance between the Schwab model portfolios and the mean-variance efficient frontier is testimony not to the richness of the mean-variance framework, but to its poverty. This is because application of the mean-variance optimizer adds no significant

value; almost any portfolio that combines mutual funds is close to the mean-variance frontier.

The questions that mutual fund companies struggle with are not questions about the mean-variance optimizer. The questions are real questions: How do we assess the attitudes of investors toward risk and expected returns? How do we distinguish attitudes built on information from attitudes built on ignorance? How do we direct the attention of investors to the need for savings? How do we hold investors' hands when markets are choppy? These are important questions, and they should challenge finance researchers.

The portfolio construction advice of mutual fund companies is good, but surely not good enough. We know that the advice is not good enough because, if it were, there would be no demand for financial advisors. Investors are willing to pay the fees of investment advisors because the portfolio construction manuals provided by mutual fund companies are like the automobile construction manuals that come with automobile kits. Not everyone is ready to devote the time, learn the skills, and assume the

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responsibilities that come with constructing an automobile from parts. And not everyone is ready to devote the time, learn the skills, and assume the responsibilities that come with constructing a portfolio from mutual funds.

Gasparino [1997] writes that, according to a recent Dalbar survey:

a whopping 89% of fund customers say they need a personal financial adviser to help them manage assets of \$100,000 or more. The survey also showed that the desire for advice grew among the more educated, and that investors with a college education demanded more advice than those with only a high-school diploma.

Investors seem to want more than mutual funds and manuals for constructing portfolios from mutual funds. And, as Gasparino writes, even mutual fund companies that once scoffed at the idea of coaching investors find that they must coach. Some mutual fund companies, such as Scudder, use in-house advisors. Others, such as Dreyfus, direct investors to independent financial planners.

It is difficult to tell what comes next, but the relationships among mutual fund companies, other members of the financial services industry, and investors are surely not at equilibrium; the new world of investors is much too new. Learning is difficult, and it takes time, but it will take place. Some investors who use financial planners now might learn to do the work themselves. Other investors who think that they can do the work themselves might find that they know less than they imagined. Many will find that they need advisors not only as teachers but also as parents who hold their hands when the going gets rough.

The world of mutual funds today is like the world of brokerage firms in the mid-1970s. The advent of discount brokers did not wipe out full-fee brokers. But it surely increased the variety of services offered by the brokerage industry and focused attention on the relationship between services and fees.

Some of this process has already taken place in the mutual fund industry. Front-end loads of 8.5% are no longer common; they are eliminated in some funds, and disguised as back-end loads and 12b-1 fees in others. Still, many investors are now paying 1% or 2% to

managers of mutual funds and another 1% or 2% to financial planners who assemble these mutual funds in portfolios. It is difficult to tell precisely how these services and fee structures will change, but one thing we know is that change they will.

ENDNOTES

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¹The linguistic link between layers and investments is worth noting. The word "invest" comes from the Latin *investire*, meaning to clothe or surround. Investment involves clothing or covering oneself with layers.

²We could not identify the Lehman Brothers Short-Intermediate Government Bond Index cited by Schwab, and replaced it with a five-year Government Bond Index.

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