

Wake Up and Smell the Coffee! DC Plans Aren't Working: *Here's How to Fix Them*

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Defined contribution (DC) pension plans are becoming the dominant mechanism by which Americans—and others—save for retirement, and by which their employers help them to do so.

But sit up and take note: DC plans are not working, if they're meant to provide security in retirement for the workers that contribute to them. Median balances at retirement are only \$44,000; average balances, which give a large weight to higher-income investors, are only \$112,000. No one can retire on these amounts. We're kidding ourselves when we refer to DC plans as "retirement plans."

There are lots of reasons why the plans aren't working. Participants are not contributing to them, or they're contributing far too little; they're borrowing from them, or spending their plan balances when they change jobs. Many participants are earning terrible investment returns while paying exorbitant fees. Most participants have no clue how to generate a lifetime income when they retire. Many spend substantial portions of their 401(k) savings; given the average income levels of most people, even relatively modest financial emergencies are more likely to come from savings than from income planned for expenditure.

Thus, the technology for managing DC plans is critical, and we need to get it right. Our employees' financial security in retirement depends on it, and as fiduciaries, we have

the task, even the duty, to provide the best methods available. The investment management industry is not doing a good job of it now, but it's not that difficult, and the benefits of doing it well are tremendous. They make the difference between employees being able to retire on what they've saved or falling drastically short of that goal and suffering the consequences.

The technology for saving and investing today to receive a benefit in the far future is already in place, and is in use by well-managed defined-benefit (DB) pension plans (and yes there are many), insurance companies, and endowed institutions. Briefly, the investment part of the solution can be described as:

- Maximizing beta (market) return per unit of beta risk taken, by holding a portfolio of asset classes that is on the efficient frontier.
- Adding alpha—or, more precisely, maximizing alpha (active return) per unit of alpha risk taken, if, but only if, the investor, with the aid of the sponsor, has skill in active manager selection.
- Carefully controlling investment management and administrative costs.

But the first step, investing the money wisely, is less than half the trick. It is even more important to figure out how much must be contributed to the plan each month (counting

employee and employer contributions together)—that is, how much regular periodic saving is required to achieve one’s retirement goals. Because DC plans cannot force participants to save any particular amount, or even to participate at all, the techniques required to achieve the needed savings rate must be behavioral (and may not work even if executed skillfully). Yes, the money that is saved needs to be invested according to the principles we just mentioned, but that is secondary to an adequate savings rate.

And third, the exit strategy or payout of funds for consumption during retirement needs to be managed, and this final phase has received very little attention from DC-plan sponsors. We would also note that a DC plan is, of course, not really a pension (income) plan but a savings plan, and that savings need to be converted to periodic cash flows—income—during retirement to be useful to the saver. Therefore, we’ll emphasize the payout solution; that is, the conversion of savings to income through annuities, planned drawdowns, or other mechanisms, as an integral and vitally important part of sound DC technology.

Thus we refer to three components that are needed for DC plans to have a chance at working as effective retirement vehicles:

- A contribution, or savings, component
- An investment component
- A payout component

All of these are achievable with existing technology; none of the solutions is perfect, but all are much better than current practice. It’s just a matter of using them. This will require some effort, but we have plenty of reasons to expend that effort. And good results in this enterprise make an employer more competitive in labor markets, because sound retirement benefits are highly valued by employees. A well-managed DC plan compensates, at least to a degree, for the opportunity lost by not having a DB pension plan.

To show how DC plans can be better managed, we first describe the problems with current practice. These include the self-defeating behavior of participants as well as the issues caused by poor plan design. We then suggest approaches to providing the contribution component (“Automatic for the People”), the investment component (focused on return, risk, and cost), and the payout component. These three components sum to a complete investment solution (insofar as can be achieved within the

constrained DC setting).¹ This solution is not just concerned with maximizing investment return; it includes boosting contribution (savings) rates, achieving favorable investment results, and structuring payout sensibly upon retirement.

THE TROUBLED DC PLAN

What DC Plans should be able to Accomplish

A DC plan is not inherently a bad idea. The goal of any pension plan is to spread the income earned during one’s working lifetime over one’s entire lifetime. This can be accomplished through either a DB or DC structure. A DC structure that is likely to accomplish these goals would look something like this template:

- Counting both employee and employer sources of funding, the plan would allow deferral of at least 15%, and in some cases up to 30%, of total compensation, the exact amount being more a function of interest rate levels, life expectancies, and start dates than anything else.
- The plan would invest the money in an efficient—that is, fully diversified—portfolio of asset classes (potentially including skillfully chosen, actively managed funds as well as index funds) at a risk level appropriate to the participant, with careful attention to costs.
- Upon retirement, the plan would pay the benefit as a life annuity (presumably with a spouse survivor benefit), or as a mix of lump sum (asset) and life annuity benefits in a manner that is consistent with the participant’s continued financial well-being.

This simple yet ambitious design replicates as many of the desirable aspects of DB plans as can be arranged in a DC plan: forced savings, professional investment management at low cost, and a fully or partially annuitized payout that hedges the participant’s longevity risk. (Longevity risk is the risk of outliving one’s means of support, or of outliving one’s life expectancy.) There are some hurdles to achieving this: In particular, current law does not make forced savings possible for most sponsors. And, as we’ll see, it can be expensive to annuitize the payout. But this template is useful as a comparator for noting how poorly DC plans are currently managed, and for outlining a better approach.

What DC Plans are Accomplishing

In contrast, the experience of most DC plan participants is something like this:

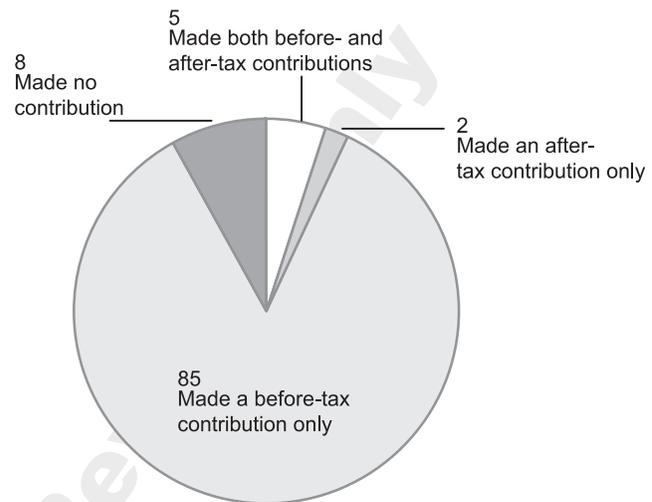
- A savings or deferred compensation rate that can range from zero to somewhere north of 15%, depending on the rate the participant selects, the generosity of the company match, and any “caps,” or legal or plan restrictions, that apply.
- A haphazardly managed assortment of mutual funds—at retail fees—chosen by the participant with no knowledge of what an efficient frontier is, how to get to the frontier, or which managers (from a menu of active and index choices) are any good; worse yet, the available managers must often be chosen from a lineup dominated by high-cost, actively managed funds chosen by the sponsor only because they are provided by the record-keeper, with little or no skill at evaluating their prospective ability to deliver positive alpha. Typically a given participant’s policy mix will be either very conservative and low-yielding or very risky; in either case, the portfolio will be heavily active.
- During one’s working lifetime, the participant may have depleted the balance through borrowing (home improvements; college for children), or even to meet financial needs when in distress (between jobs; auto repairs; etc.).
- Anything that is left is either paid out upon retirement as a lump sum, or left in the plan; either way, is it up to participants to invest their accumulated savings in a way that will sustain them for the rest of their lives. Good luck.

Contribution Rates

A DC plan is a savings plan, and in any savings plan, the critical variable is, of course, the amount saved. (Heroic investment returns can substantially reduce the amount that one needs to save, but by now, after eight years of a sideways stock market, we hope that investors would have learned not to rely on them.) Exhibits 1 and 2 show the contribution (savings) rates of DC plan participants. These rates include company matches, and after-tax as well as before-tax contributions by employees.² (The left bar in Exhibit 2 is for non-highly compensated employees, and the right bar is for highly compensated employees; highly

EXHIBIT 1 Distribution of DC Plan Participants by Contribution Status

(percentage of all participants)



Source: Holden and VanDerhei [2001]. Data collected in 1999.

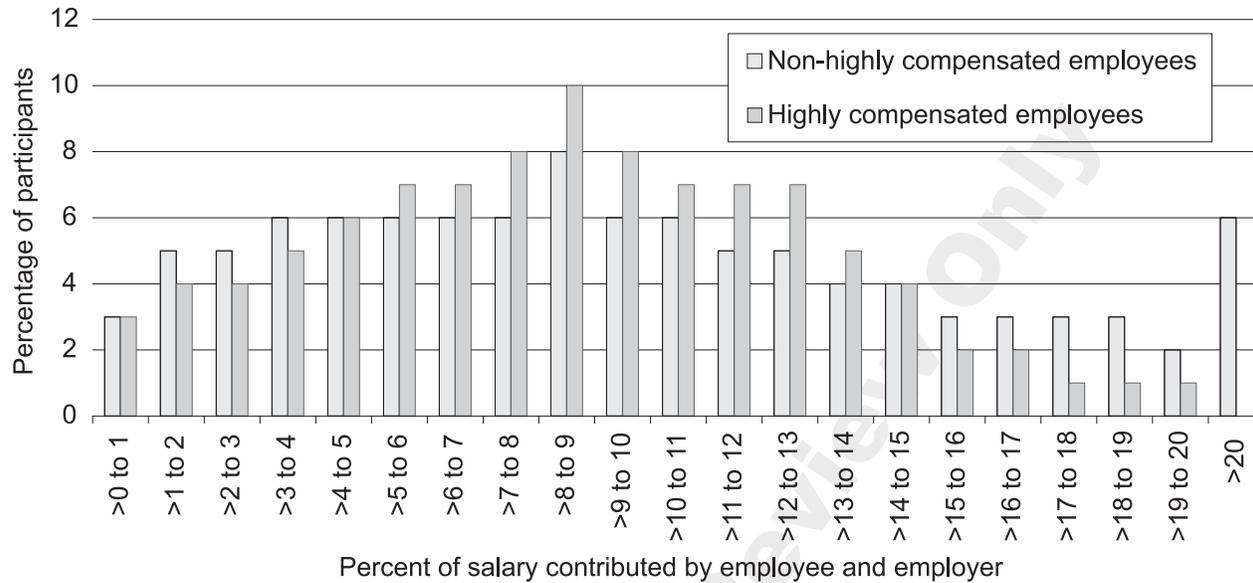
compensated employees do not typically achieve high savings rates within the plan because they quickly reach an IRS contribution limit.)

The modal, or most common, savings rate is 8%–9%. Waring, Siegel, and Kohn [2004] showed that “a worker who (together with his or her employer) saves 9% of income each year for 40 years, and who experiences wage growth of 3% per year and who earns a constant 6% rate of return (after all costs have been deducted), will be able to replace only 41% of pre-retirement income.” Add this to Social Security, and one may be able to survive on the result, but it is not a comfortable retirement. And it requires saving for 40 years (starting at age 25, if one hopes to retire at 65), never being unemployed or borrowing from the plan, never taking the fund balance as a taxable payout, and earning an after-cost rate of return that can only be achieved by taking a good deal of risk, 6% being well above the Treasury bond yield. (“Risk” means, of course, that the realized return could be far lower.) These are heroic assumptions, and we haven’t made any provision for post-retirement inflation protection. It’s a discouraging picture.

How much would this worker have to save to replace the 75% of pre-retirement income that is often considered the benchmark for a successful retirement? A 15% savings rate is about right for medium to high-income

EXHIBIT 2

Distribution of Participants by Total Contribution Rate, 1999



Source: Holden and VanDerhei [2001].

employees,³ again given 40 years to save, with no borrowing or pre-retirement payout, if the investor can earn a decent realized return—“decent” meaning the expected market rate of return on a medium-risk portfolio that is on the efficient frontier, minus index-fund-level fees. Since almost no one gets this many lucky breaks, the savings rate had better be much higher than 15% in periods when the participant can save.

Most DC plans are not structured to accommodate such high savings rates; there are tax and other rules that limit contributions. But except in extraordinary circumstances, participants clearly must save the maximum permitted in their DC plans, and then a bunch more in their personal taxable portfolios, in order to have a strong expectation of a retirement income replacement ratio in the comfortable 75% range.⁴

Having established that the average saver is likely to fall short of his or her retirement goals, we are also especially concerned about those who save less than the average—those to the left of the hump in the bell curve—including the 8% of all plan participants who save *nothing*. These workers will have to live on their Social Security benefits, plus any savings they have outside their DC plans; typically they have very little.⁵

Later, as we describe the contribution component, we’ll indicate how employees can be induced to increase their savings rates.

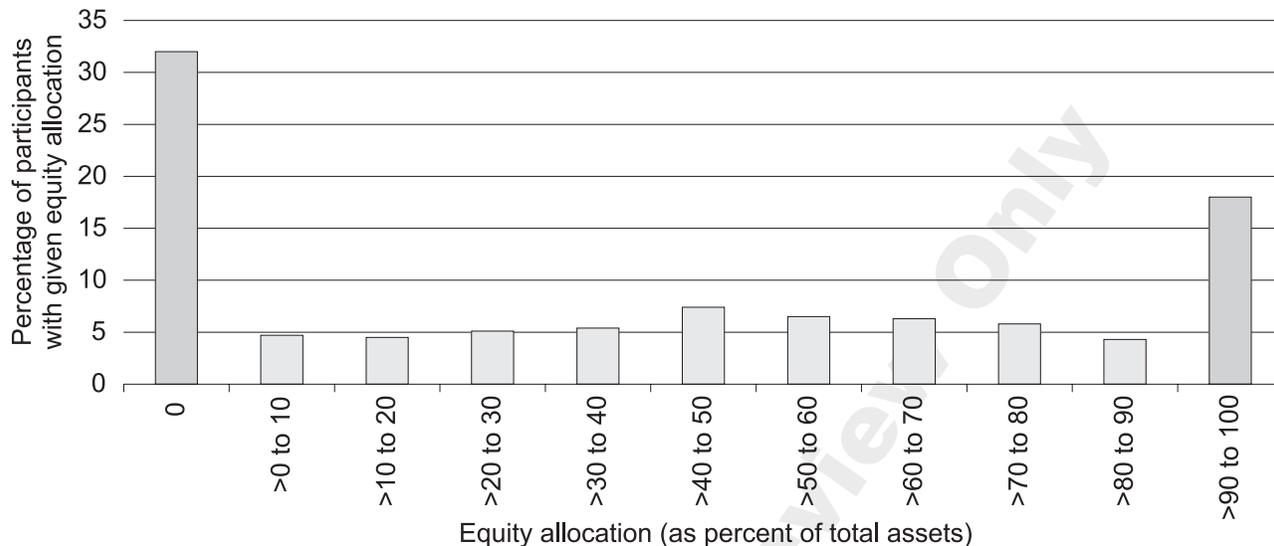
Investment Results of DC Plan Participants

In general (this isn’t true for every single participant of every plan, obviously), investment results of DC plan participants have been dismal. This has occurred for two reasons: 1) in playing “Chief Investment Officer,” a job for which they are uniquely unqualified, participants often act against their own interest; and 2) the choices offered by their employers are often not very good, providing low returns at high cost.

Beta: Getting the asset allocation and risk level wrong. Because the asset mix of DC plans when observed in the aggregate across all participants is not bad, averaging 60%–70% in equities, one might guess that individual participants’ allocations are also sensible. This guess would be dead wrong. Exhibit 3 shows that a majority of participants either have no equities or almost all (80% or more) equities. Either way, the risk level is wrong: A portfolio with no equities cannot provide the returns required and expected by participants, and a portfolio of 80% or more in equities is far too risky for most participants, as evidenced by the 50% decline in the U.S. stock

EXHIBIT 3

Percent of Assets Allocated to Equity Funds Varies Widely Among Participants



Source: Based on Figure 10 in Holden and VanDerhei [2005], with updates and additional detail obtained from EBRI.

market in 2000–2002. We’re not making any specific forecast, but statistically and logically, such a decline could happen again.⁶

And in case your rosy view of human nature leads you to conclude that the aggressive, all-equity investors must be young workers who can afford to take the risk, and the equity avoiders are conservative older investors, guess again. Extreme allocations are evenly distributed across young and older workers, as shown in Exhibit 4.

Clearly, DC-plan participants have demonstrated themselves to be unsuccessful in making the most basic asset allocation decision, that of how much to invest in equities, and could use some professional help. Do you think that, if given the full set of asset class building block tools, they’d be able to build a portfolio on the true efficient frontier, consisting as it does of various styles of global equities and fixed income, inflation-indexed bonds, real estate, commodities, and private securities? Let’s leave that as a rhetorical question, and just jump ahead to the suggestion, which we’ll flesh out later in this article, that we investment professionals should “just do it for them.”

DC-plan participants have also, not surprisingly, proven to be poor market timers. In the booming 1990s, average equity allocations in DC plans soared from 45% to more than 70%; then, as shown in Exhibit 5, they fell below 60% as the market sharply declined in 2000–2002.

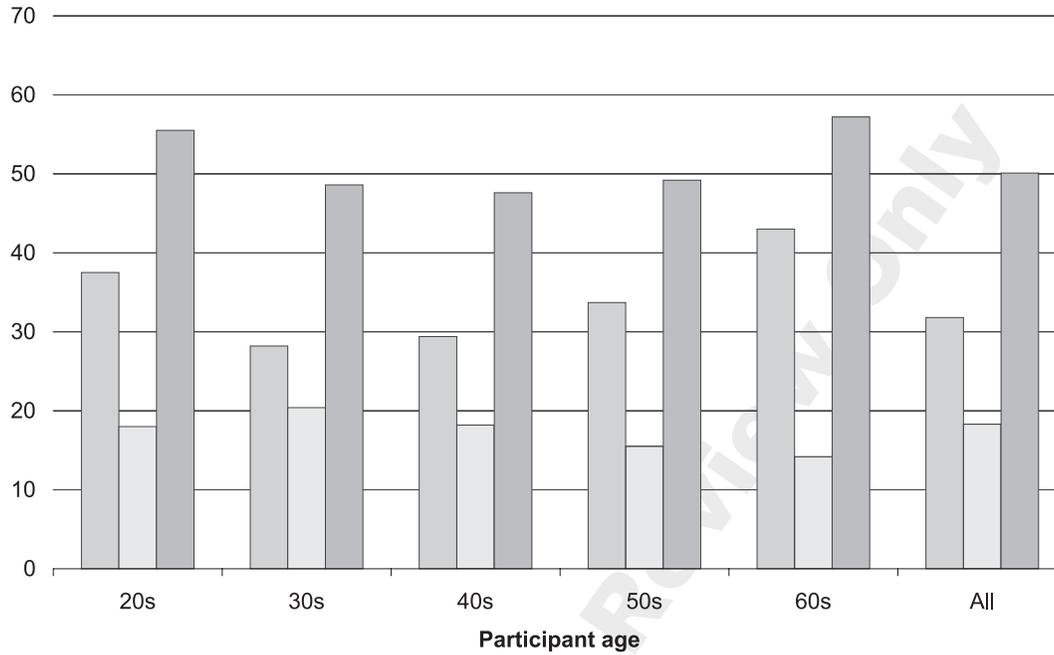
The percentage has been creeping back up as the market has recovered, and is once again nearing 70%. Remembering that these averages are unrepresentative of individual participants’ allocations, Exhibit 5 shows that participants in aggregate were almost perfect *reverse* market timers, buying before a decline and selling before an advance in the market. The returns must have been seriously disappointing. We don’t have return data over the full period, but Exhibit 6 compares returns on DC plans to those of DB plans over the bear market years of 2000–2002, and the results are truly discouraging: the median DC plan underperformed by almost 4% per year! Buying high and selling low is a natural human failing, widely documented, but it’s costly to investors even if the behavior is easy to understand.

Some of these fluctuations in equity allocation are, of course, simply due to a buy-hold-and-don’t-rebalance strategy. A rising equity market causes the percentage allocation to equities to increase without the participant taking any action. However, participants are constantly investing newly earned money, and we believe from anecdotal evidence that they allocated more of this new money to equities at the peak of the bubble, and less at the bottom of the crash, supporting our charge of successful reverse market timing.

Alpha: Getting manager selection and active risk budgeting wrong. With “help” from their employers and even more from their fund providers, DC-plan participants have

EXHIBIT 4

Extreme Allocations Exist for Both Young and Older Workers

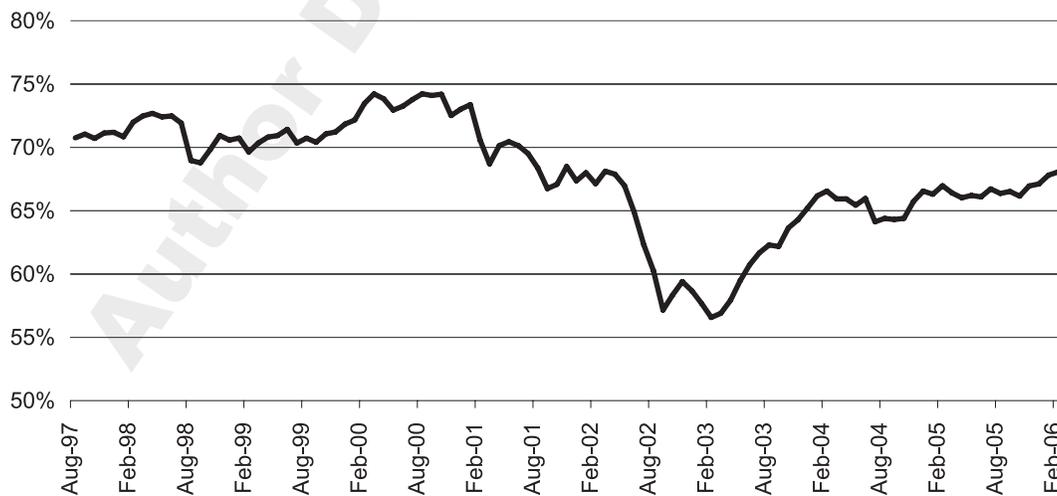


Source: Holden and VanDerhei (200x).

Left bar: percentage of participants with no equities; Middle bar: percentage of participants with 90% or more in equities; Right bar: sum of two.

EXHIBIT 5

Changing Overall Equity Allocation of DC Plans over Time



Source: Hewitt Associates LLC, 2006.

EXHIBIT 6

Median Rates of Return for 401 (k) and Defined Benefit Plans

	Defined		Difference
	401(k) Plans	Benefit Plans	
2000	-4.28%	0.00%	-4.28%
2001	-7.30%	-3.82%	-3.48%
2002	-12.28%	-8.43%	-3.85%

Source: Watson Wyatt Worldwide, press release, November 22, 2004.

also managed to handle poorly what professional investors call their “active risk budgets”—the additional risks (and management costs) they are willing to take in the hope of earning returns above those of index funds or asset-class benchmarks. Specifically, participants take too much active risk, and it is, more often than not, active risk with no reward, or with a negative reward.

To review briefly the problem faced by those who would invest with active managers, note that active management is a zero-sum game. One manager’s gain relative to the benchmark is another’s loss. Moreover, it’s a zero-sum game only *before* fees and costs; it’s a negative-sum game after fees and costs.⁷ Thus, if the results of all active managers are represented by a bell curve, you have to choose managers who will be on the right-hand side of the bell curve by a margin large enough to more than compensate for the fees and costs of active management—and that part of the bell curve is not thickly populated. And it isn’t good enough that you can look back and see that your managers were on the right part of the bell curve after the fact; you have to believe, reasonably, that you have the ability, before the fact, to pick those few skillful managers from a population that is average before costs, and below average after costs.

So you can’t win this game just by trying; you can’t earn alpha simply by investing with active managers instead of index funds. Instead, it is necessary to perform the kind of rigorous, skill-based analysis that would lead one to conclude that a given manager will be, in the future, in the desired part of the bell curve. Professional investors perform this analysis with mixed success, but it is not a hopeless task—and many pensions, foundations, and endowments have earned respectable alphas in this way.⁸

Individual investors, however, are in an extremely poor position to conduct this analysis. They simply have to rely on the hope that the fund list provided by their employer contains winning active managers. It’s possible that the employer has competently and benevolently screened the universe of available active managers and selected the best ones. But, too often, they haven’t. Too many employers are unaware of the zero-sum nature of active management, and seem to believe that the administrator’s well-known active managers are presumptively likely to be “good” managers—why else would they be still in business, with so much money under management? Such sponsors are simply unqualified to analyze investment managers. Investing in funds selected by such methods is the wrong way to take active risk.

Thus, most of the active risk taken by DC-plan participants is wasteful; they are taking too much of it, at too high a cost, and for the wrong reasons. And absent the talent and tools for selecting active managers more skillfully, these participants would do better to index large portions of their portfolios—if given that choice.

Today, in contrast to just a few years ago, most plans offer at least some low-cost index funds—such that many participants can just index if they want, avoiding active manager selection issues, at least in one or two of the major asset classes. However, the presentation of plan choices typically makes no distinction between active and index offerings, and the participant has no prior or outside knowledge of the issues involved. As a result, the investor doesn’t know that it is appropriate to select an active fund only when he or she fairly expects a given fund to produce an alpha sufficient to justify the active risk taken as well as the higher cost.

In addition, participants pursue “hot” funds and visible brands; they hold on to old fund choices when newer and better ones are offered; and, in defiance of more than a half century of portfolio theory, they hold their own employer’s stock in the portfolio, sometimes in overly large quantities.⁹

Thus, participants hold too much in actively managed funds, especially in active funds that underperform their benchmarks. Since investors are going to continue to behave irrationally, suffer from knowledge deficits, and have other human frailties, the best one can do is to fix the plan-design part so that investors are guided toward holding not only an appropriate asset-class mix but a sensible and potentially winning blend of index funds and various types of active managers.

Investment fees and costs. The surest way to increase one's return is to lower one's costs, which are the only investment variable that an investor really controls. Unlike risk-taking, which has an upside, investor costs affect the net return to the participant in only one direction: down. Let's examine the impact of a typical level of costs, 1% per year, on a DC plan balance accumulated over a long period and invested in retail mutual funds.

Exhibit 7 shows the growth of the DC-plan balance of a hypothetical worker who was born in 1940 and who retired at the end of 2005, at age 65, after working for 40 years. We assume that he earned the U.S. median family income each year, and that 15% of that income was invested in a tax-deferred plan, using ERISA-qualified institutional commingled index funds with zero tracking error and a low 0.05% annual fee, in a 60/40 mix of S&P 500 stocks and intermediate-term U.S. Treasury bonds, rebalanced annually.¹⁰ (Never mind that index funds were not available over the whole period; they are now, and will be going forward.)

The terminal balance of this savings plan, at index fund levels of cost, is a robust \$1,217,365, enough to purchase a taxable annuity paying over \$90,000 a year, given current interest rates and mortality assumptions. But if

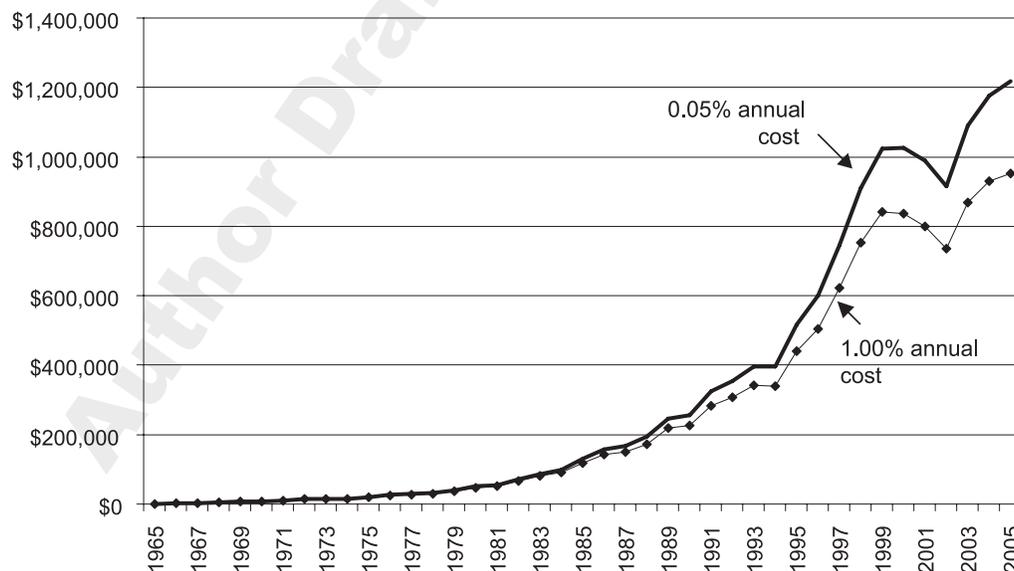
instead we assumed that the investor was using retail mutual funds, with fees of 1% annually, and with the same before-cost returns, the balance would only be \$952,980. The difference, over \$250,000, or five years' pay, is transferred to investment managers.

This level of cost might have been a bargain if those managers were skillful and added alpha much greater than this cost. But in the arrangements used most often today for picking active managers, as discussed above, such outcomes are only remotely possible, and through chance alone rather than skill.

(This example also shows the ability of a well-managed DC plan to accumulate more than enough money to retire, if the savings rate is high enough and the worker saves every year, never withdrawing money or losing his job. But before jumping for joy, you should remember that the 1965–2005 period includes the greatest bull market in history—a 24-fold increase in the S&P 500 total return benchmark from 1982–2000—as well as some severe bear markets. This performance, which netted out well above expectations, is unlikely to be repeated in the next equivalent period.)

To minimize investment costs paid by the participant, sponsors could encourage participants to invest

EXHIBIT 7
Cumulative Savings After Deducting 0.05% and 1% Annual Costs



Calculated by the authors using Ibbotson Associates data by permission of Morningstar, Inc. Assumes worker earning U.S. median income over 1965–2005, saving 15% of income and investing in a 60-40 mix of S&P 500 stocks and intermediate Treasury bonds.

solely in index funds. The better solution, however, is for sponsors to actually evaluate active managers for a fair expectation of whether they will beat their benchmarks, and to guide participants into a carefully considered mix of index funds, low-risk active funds, and where quality funds can be found, some traditional or higher-risk active funds. We flesh out this solution, which carefully controls costs while taking advantage of alpha opportunities, later in this article, in “The Investment Component.”

To sum up, DC-plan investments are generally poorly managed, with low returns, high risk, very high costs, and little support for a good beta policy or for good alpha decisions. Given such a combination, it’s difficult, if not impossible, for participants to accumulate much of a balance. Sponsors and participants must share the blame for these results: Sponsors have not clearly thought out the asset class and fund offerings in which participants

can invest, and participants have found myriad ways to act against their own interest. We can do much better.

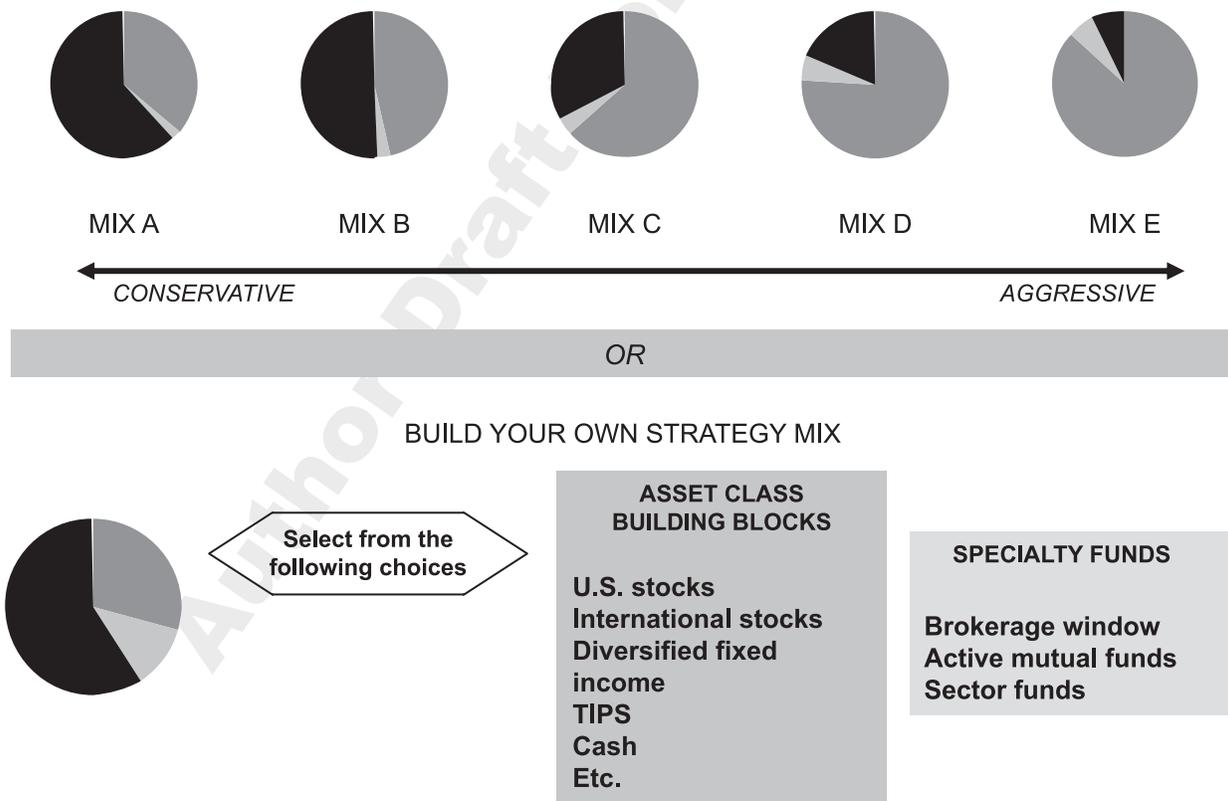
Payout: “Good-Bye and Good Luck”

Then, when it comes time to retire, most DC plans do not offer much beyond “good-bye and good luck.” Even participants who do not take a lump sum payout are pretty much on their own, trying to figure out (with the aid of employer-provided educational programs and aggressive and sometimes conflicting “rollover” marketing from fund providers) how to manage withdrawals so that they achieve an adequate income while making sure they do not run out of money before they die. In contrast, what many participants seem to want—and understandably so—is a way to convert the DC plan to the equivalent of a DB plan: a check every two weeks for the rest of one’s life.

The technology to make this conversion already exists, of course, in the form of fixed-rate life annuities,

EXHIBIT 8

Participants Choose from the following:



Source: Barclays Global Investors.

but, as we will discuss, it is seldom available to retirees in an efficient or cost-effective manner even where the spirit is otherwise right. A few sponsors offer annuities as a payout option, either allowing employees to purchase units of variable annuity contracts during the accumulation phase that will turn into fixed annuities at retirement (a particularly expensive path), or facilitating a conversion of their balance to a fixed-rate life annuity on retirement, or both (this is the model used by TIAA-CREF and its clients). Other sponsors inform participants, through educational programs, that commercially provided fixed life annuities are one payout option; but again, these are usually expensive.

But mostly, employees are left to their own devices to make withdrawals at such a rate that their typically modest savings will last for the rest of their lives, a task to which they are ill suited and that is almost impossible in the absence of the right tool kit.

The benefit of a fixed-rate life annuity, of course, is that it spreads longevity risk, the risk of outliving one's money, over a broad population of participants.¹¹ And ideally, such annuities would be available at fair prices. We do not expect, at least in the near future, that most sponsors will provide an ideal, reasonably priced annuitization opportunity, but other financial instruments are helpful, and we'll review them in "The Payout Component." But the sponsor can still help greatly, by providing sound post-retirement *investments*, not just education.

GETTING DC PLANS RIGHT

Having outlined the problems with existing DC plans, let's outline a DC plan system that we'd design if we could start from scratch, of course within the confines of what is legally allowed.

The Contribution Component: "Automatic for the People"

Decades of research on behavioral finance, combined with the common-sense experience that comes from working with participants, suggest that the best way to get people to save is to do it for them. DB plans do exactly that, lowering current compensation to provide funds to be invested for deferred compensation. DC-plan sponsors aren't allowed to require participants to defer a portion of their compensation, but they can do something almost as effective, providing a suite of automatic

saving and investing mechanisms that the participant can opt out of only by taking deliberate steps.

Automatic enrollment. The most basic of these steps is automatic enrollment. Samuelson and Zeckhauser [1988] were among the first to observe that many participants do not pay much attention to their retirement arrangements; they decide on a contribution rate and an asset mix when they get a job, and then rarely if ever revisit these decisions. For young workers or others at low wage levels, this may mean a zero or very low contribution level. Thus the first and best opportunity to get the participant to act wisely is upon hiring.

As evidence of the need to automate the saving for retirement, the Employee Benefits Research Institute (EBRI) reports that one-third of eligible employees do not participate in DC plans, more than 90% of participants do not maximize contributions, 19% fail to diversify across asset classes, and a whopping 86% of participants fail to rebalance their portfolios over time.

Realizing this, a growing number of progressive sponsors have adopted automatic enrollment plan features. According to an EBRI/Investment Company Institute study, automatic enrollment increases participation among all eligible workers from 66% to 92%.¹² However, default contribution rates in most automatic enrollment plans are very conservative and need to be much higher to achieve the post-retirement income goals we discussed earlier.¹³

Defaulting to a diversified portfolio. As we've noted, at the time of hiring, the participant is also asked to decide on an investment strategy, and the employer provides a default option for those who do not have a strategy in mind (and most people, even those who know a little about investing, have other things on their mind at this typically hectic transition in their lives).

Although stable value funds and money market funds are very common default choices (27% and 18% respectively), we're pleased to report that lifecycle funds have moved into first place (38%) and are still growing in acceptance.¹⁴ Sponsors are beginning to recognize that a 100% cash allocation is not "conservative" but, in fact, nearly as extreme as a 100% equity allocation—it does not always even keep up with inflation and is almost guaranteed to underperform other asset classes, such as equities and bonds, over any long time horizon. There is probably not one professionally managed endowment, foundation, or DB pension fund in the United States that would invest solely in cash—so, knowing what we do

about participant inertia, why would we direct savings into such an extreme option for our employees?

Lastly, and very importantly, regulation and legislation seem to be leaning toward more diversified default investment vehicles. The new Pension Protection Act of 2006, while not yet fully implemented by supporting regulations, seems to give strong encouragement to diversified portfolios as default choices, and it provides additional safe harbors for solutions that in the past might have been thought to contain too much “advice.” Both of these changes point directly at families of lifestyle funds as preferred choices.

We would like to see all sponsors have a fund on the efficient frontier, diversified across asset classes, as the default choice. We’ll explain this recommendation in detail below, in “The Investment Solution.”

Auto-escalation plans. Those same diabolically clever behavioral scientists have also devised a plan to get participants to increase their contribution rates over time. Finding that many employees are (or think they are) unable to live on a paycheck from which a large DC-plan contribution has been deducted, Thaler and Benartzi [2001] proposed asking employees to commit a portion of future raises to the DC plan. Called Save More Tomorrow (abbreviated as SMarT, although it seems like it should be SMorT), the program is said by Thaler and Benartzi to be wildly successful in test sites. According to an article describing their method, “The first implementation of the SMarT plan yielded dramatic results. The average saving rates for SMarT plan participants more than tripled, from 3.5% to 11.6%, over the course of 28 months.”¹⁵ (One key aspect of the program, making it less scary to employees, is that one can opt out of it at any time—but few employees do.)

Following this lead, the SMarT plan, and other “auto-escalation” plans that ratchet up the participant’s contribution level over time, have begun to catch on. At the high adoption rates we anecdotally hear about, auto-escalation plans could become a prominent feature of the DC-plan landscape within just a few years. This would be a tremendous boon to participant savings rates.

The Investment Component

We are not without guidance in designing intelligent investment programs for DC-plan participants. Traditional professionally managed investment pools, including DB plans, endowments, foundations, and family offices, have

spent much of the last half century putting forth great effort to apply the techniques that constitute portfolio theory as it is now understood. These techniques have, as their starting point, Harry Markowitz’s [1952] principle of mean-variance optimization, and are greatly influenced by William Sharpe’s [1963] market model, which separates the return on any investment into a part (“beta”) that is explained by co-movement with the broad market portfolio or index, and another part (“alpha”) that is independent of such co-movement. (The alpha part is usually interpreted as value added, or subtracted, by an active manager.)

Let’s apply these techniques to DC plans. As we interpret them, the basic lessons of portfolio theory are:

1. *Diversify*, using optimization to identify and hold portfolios on the “efficient frontier,” portfolios that have the highest expected return per unit of risk taken. Now, noting that risk is separable into beta and alpha components of risk,
 - 1a. Beta risk is inherently rewarded, so that just about all investors will want to take some mix of beta risks.
 - 1b. Alpha risk is not inherently rewarded; active management, the pursuit of alpha relative to a benchmark, is a zero-sum game before costs, and negative-sum after costs. But there are winners, and investors who can pick the winners can profit significantly from alpha.
2. *Applying the principle of optimization* separately to beta and alpha,
 - 2a. Try to get the best possible deal for the beta risk taken. That is, obtain the highest expected return per unit of beta risk, by optimizing across asset classes (which are the source of beta risk).
 - 2b. Try to get the best possible deal for the alpha risk taken, by hiring active managers only when one has compelling evidence that the manager is likely to beat his or her benchmark after costs. One can then optimize across *managers*—index and active—to obtain the highest expected alpha per unit of active risk (alpha risk).
3. *Control costs very carefully.*

Beta: Getting a good deal for the beta risk taken. Since beta risk is inherently rewarded through the expected risk premium, getting a good deal for the beta risk taken

is basically an engineering problem. There are three steps to this problem: 1) determining the opportunity set of relevant or available asset classes; 2) determining what mixes of those asset classes are on the efficient frontier; and 3) deciding which efficient portfolio you want.

The most interesting and controversial of these questions is the determination of the relevant set of asset classes. Over the past few decades, the opportunity set of asset classes has expanded greatly.

The original choice set was U.S. equities and bonds. Today, asset classes available to DC-plan investors may include various styles of U.S. and international (including emerging market) equities; various maturities and credit qualities of fixed income; inflation-indexed bonds, or TIPS; real estate securities, such as REIT funds; and commodities.¹⁶

Remember that DC-plan participants, faced with such an expanded choice set, will generally not know much about any of these novel offerings (although education can help). As a result, we strongly believe that pre-mixed asset allocation funds, called lifecycle or lifestyle funds, should be offered—and featured (“do it for them”)—and that these funds should include much from this broad array of asset classes: that is how you get on the efficient frontier.

Question 2, determining which mixes are on the efficient frontier, is solved through optimization. Much has been written about optimization, and its limitations as well as its advantages have been pointed out; we won't repeat these arguments here. We'd sum up our views by saying that professional managers of asset allocation funds should know the fine points of optimization technique, including an awareness of the shortcomings of optimization and the need to account and possibly adjust for estimation error in the inputs. DC-plan participants building their own portfolios will not have this knowledge.

Question 3, determining which portfolio on the efficient frontier to hold, is a matter of the investor's risk preference. Like sock sizes, where a few sizes fit a wide variety of different feet, you don't need many different risk levels to cover the needs of most investors. While we've heard arguments that investors need a great deal of customization in their portfolios, we disagree and believe that as few as five mixes, “conservative, moderately conservative, moderate, moderately aggressive, aggressive,” are probably enough. And for target time horizon versions of asset allocation funds, five mixes likewise seem to satisfy most needs.

Alpha: Getting a good deal for the active risk taken.

While alpha is a zero-sum game when summed over all the managers in a market, any given manager will either be a winner or a loser. The objective is 1) to decide whether one can pick the winners, from a population of managers that is guaranteed to have more losers than winners after costs have been taken into account; and 2) if the answer to (1) is yes, to estimate the expected alpha and expected active risk of each manager. This second step makes it possible to optimize across managers, maximizing total portfolio alpha per unit of active risk taken.

Most investors are uncomfortable with the concept of expected alpha, because they've been told that alpha is the unexpected component of return. Yet if an investor expects a manager to deliver a zero alpha, he or she should index instead. It is necessary to have a positive expected alpha for a manager to justify hiring him or her, but such an estimate has value only conditional on the skill of the estimator.

Given estimates of expected alpha and expected active risk for a set of managers, a technique called manager structure optimization can be used to build an efficient portfolio, in a spirit very similar to that asset-class optimization. Waring et al. [2000] describe this technique in detail.¹⁷

We don't expect many DC-plan participants to follow this very technical advice (but if not following it, they really shouldn't be using active funds at all). But professional asset allocators, building lifestyle funds, should do exactly that.

And for the active part of their portfolio, DC-plan participants building their own manager mixes should be given access by their employers to the best alpha sources that the employer can find, using parallel techniques. In other words, the sponsor should be skillfully choosing the active managers in the lineup, or not choose any at all.

Costs: Let's get serious about controlling them—It's a fiduciary issue. As we've already noted, the surest way to increase investment return is to reduce fees and other costs. The existing DC system almost seems designed to maximize costs, and thus to minimize after-cost return.¹⁸ Let's get serious about turning this around, getting fees and other investment costs under control.

Open architecture (Unbundling). A good first step is fee transparency. By unbundling investment fees from administrative fees, it's easier to make sensible choices of funds to offer to employees. The move toward unbundling, now usually called “open architecture,” has gathered

momentum with sponsors (it's "back to the future"—through the end of the 1980s and into the early 1990s, most DC plans were "unbundled," a term that is equivalent to "open architecture" but better).

With fully open architecture, the provider of record-keeping and administration services allows the sponsor to select funds from any other fund manager. (The sponsor may experience some increase in its recordkeeping costs as a result.)

In a common but less completely wholesome variation, the provider itself makes arrangements to offer funds from a wide variety of other fund management firms; for a fee, often substantial and always passed to the consumer, they put the other managers "on their platform." Of course the requirement for being "on their platform" is not skill, but the willingness of the manager going on the platform to pay a substantial fee, between 0.25% and 0.50% per year, for the privilege of being accessible to the platform owner's clients. This practice is not perfect, but it makes sponsors and their employees more able to hire active managers for their skill in producing alpha, rather than because they're the funds managed by the service provider.

Better use of low-cost investment vehicles. And the fund list should include index funds and other low-cost investments, not just in equities but in all the major asset classes! Traditional index funds and exchange-traded funds (ETFs) are widely available for just about every asset class, and they deliver the performance of the asset class with (typically) almost no tracking error and a very low fee; if an investor does not think he or she can pick a manager who will beat the asset class benchmark, that investor should index.¹⁹ Risk-controlled active funds, sometimes called enhanced index funds, are also an important component of a well-designed low-cost portfolio strategy. Grinold and Kahn [2000] showed that, conditional on a given level of manager skill at adding alpha, such funds surpass all other long-only structures in delivering the highest alpha per unit of risk taken.

Optimizing across cost structures. Looking back on our comment on optimizing across managers, we now see that costs and active risk can be managed together, by blending index funds and/or ETFs, risk-controlled active funds, traditional active funds, and potentially even market-neutral long-short funds (which are pure potential alpha sources) using the technique called manager structure optimization (see Waring et al. [2000]). We are not trying to minimize costs *per se*; that would mean just indexing. Recognizing the opportunity in active management, we

are trying to maximize expected alpha after costs, not in an absolute sense but per unit of active risk taken. In other words, we are trying to spend the employee's active risk "budget" as fruitfully as possible.

Commingled trust funds (CTFs). Finally, ERISA-qualified institutional commingled (or collective) trust funds (CTFs) enable any strategy, indexed or active, to be pursued in a DC plan with a much lower-than-retail fee, and while they were originally designed for DB plans, they are perfectly acceptable for use in DC plans. Not only are retail-priced mutual funds not necessary for DC plans, it seems to us that offering retail-fee—i.e., high-fee—mutual funds is close to a breach of fiduciary responsibility on the sponsor's part: The exact same strategy—the exact same before-fee return—is also usually available from the fund manager in an institutionally priced CTF format merely by asking for it. Let's use this easy tool to reduce fees, and thus increase returns by one dollar for every dollar of fees saved.

Lifestyle funds. As we've already noted, employers and the more skillful of the fund providers are in a much better position than employees to do all of this asset-class optimization, manager selection and optimization, and cost management. As a result, we advocate a structure in which we, the investment management industry, just do this work for the employees, by offering lifestyle funds (each consisting of a fully diversified portfolio on the efficient frontier). We'll even go out on a limb and suggest that employees are best off if these are the only funds offered, although we recognize that this is often not possible; we don't expect sponsors to buy into this suggestion right away or on a large scale, but it's food for thought. At the very least, lifestyle funds should be the default option and should receive "eye-level positioning," or top billing, in plan materials, indicating to the participant that the sponsor has thought carefully about the fund offerings and finds these to be the most desirable.

Exhibit 9 shows an example of plan presentation materials designed so that diversified lifestyle funds have top billing, with funds usable for "mix-your-own" strategies given a lesser but still visible place. This strategy, advocated in a series of articles co-authored by one of us (Waring) since 1992, has proven successful in the field at the task of getting participants onto the efficient frontier, but is still today being implemented by too few sponsors. And, with regard to the latter funds, we emphasize in the presentation materials that the portfolio of funds is a *mix* and that the goal is an investment *strategy*.

The Payout Component

Most of the investment community has been focused on the accumulation phase of DC plans, which we've been discussing up to this point. But with 76 million "baby boomers" in the United States about to retire in the next quarter century,²⁰ and with the front edge of the baby boom taking early retirement now, let's focus on payout—the means by which an accumulated fund balance is converted to retirement income.

If one includes the present value of Social Security benefits, retirees and near-retirees (age 55+) in the U.S. control some \$11 trillion in assets. These assets will be used or consumed, in one way or another, to create the income that sustains retired people. Because of the profound change in focus from asset accumulation to asset de-accumulation, we need to consider what forms of financial products might best meet the needs of these people.

Life annuities. Let's assume as a starting point that what most retirees want, or should want, is a check every two weeks to replicate the payout of a DB plan.

In a perfect world, life annuities are ideally suited to this task. After all, a DB plan is just a mechanism by which employers buy life annuities for their employees.

In practice, commercially available annuities are loaded up with costs, but we can pretend for a moment that they're not. How *potentially* valuable are annuities to would-be retirees? Waring and Siegel [2007] compare the amount of savings needed to achieve a given amount of desired income—\$100,000 per year, in nominal terms (not rising with inflation)—using annuity and non-annuity approaches. (Their method ignores the bequest value of the unused part of the non-annuity solutions.²¹) For a 65-year-old single man, the amount required to purchase this annuity is \$1,180,000, assuming "completely fair" pricing with no adverse selection, no investment management or administrative costs, and no profit—comparable to the way a DB plan would implicitly price the annuity. We'll discuss these cost items in a moment.

The authors then calculated the amount that would be required to produce the same level of income for 40 years—that is, to age 105, the outer limit of one's possible life span—without benefit of annuitization. (This is done by assuming that the savings is invested in a laddered bond portfolio, running the portfolio down to a zero balance by the end of the period.) This latter amount is *much* larger: \$1,802,431. To be precise, it's 52.7% larger. The savings made possible by "completely fairly priced"

annuities, then, is huge, representing many years of the employee's income.²²

However, the cost problems of most commercial annuities are quite severe, and come in at least three major components. First, most annuities have a high "contingent deferred sales cost" (CDSC, or sales load).

Second, most annuities have a mortality and expense (M&E) cost that may range from a half percentage point to some larger amount; it is the basic "fee" charged by the issuer. The word "mortality" in "M&E cost" suggests that it is the cost of purchasing longevity insurance, but it is not; insurance against mortality risk is provided by spreading risk across the policyholders. Thus M&E cost is mostly a profit item, although there are some administrative expenses that should fairly be charged.

Third, because of fears of adverse selection by annuity purchasers, the life tables used by many, if not all, annuity providers to price the annuities are biased to reflect much longer-than-average life expectancies; this is in effect a shadow fee, especially compared with DB plans where there is no concern about adverse selection. And the extent of adverse selection is often overestimated, making it more of a real fee than a legitimate expense. Thus there are effectively three layers of fees.²³

An annuity priced without these costs would have an implicit expected return (that is, a return conditional on living to one's life expectancy) identical to the U.S. Treasury bond yield, or yield curve; but after these costs are subtracted, the effective or implicit investment return in an annuity is much lower than the Treasury rate. There have been some significant efforts at product improvement by traditional annuity providers, but it doesn't appear that these efforts solve the underlying problem that we are describing.²⁴

As well as providing the same sharing of mortality risk as traditional life annuities, another choice—inflation-indexed life annuities—provides annuity payouts that are indexed to inflation. Inflation protection implies very low real yields, and the annuities are thus even more expensive, but that protection is valuable. And of course there are all the same extra costs that diminish the implicit return, just as for nominal annuities.

Nevertheless, for retirees with a strong need to annuitize in either nominal or real terms, an expensive annuity may be better than none at all. However, the cost is sufficiently large that a substantial part of the benefit of a life annuity is wiped out. It is like investing your money at rates well below Treasury rates, but in return you get the

guarantee of a payout stream for your full life, a very long payout stream if you're fortunate enough to be alive to collect it.

A DB plan, of course, is an annuity provider, and one that doesn't have these three layers of cost. So it is very much "fairly priced." There is no reason why a DC provider couldn't offer an annuitization payout option, self-managed, on a similar basis.²⁵ But few DC sponsors seem to be interested in this opportunity, although it is the only clear method for offering a fairly priced annuity to individual employees, today. We encourage sponsors to consider this. According to a Hewitt Associates survey of DC plan sponsors, 18% of respondents said they already offered annuities as a payout option as of 2005. Of the remainder, 6% said they were very likely to add this feature in 2006.²⁶ Most of these annuities are probably provided commercially, and so may not carry the low cost advantage, but generally this is a move in the right direction.

To make annuities a more attractive choice for retirees, to make the magic of the Insurance Principle work for the customer, they'll have to be "priced to move." The insurance industry will have to re-think its approach to the business for this to happen. Standardized contracts and features that can easily be compared, standardized annuity tables that can easily be described, and a fee approach without sales costs equivalent to no-load fees in the mutual fund world will generate a market that allows consumers to comparison shop more intelligently, and to have more confidence they are getting a sharp pencil in the pricing decision. And this will make the market blossom; there is much need for a well-priced fixed life annuity.

While annuity providers might at first oppose these changes, they must be adopted if the providers ever want the market to develop depth and breadth. There is a parallel with the options market, which was costly and inefficient until the Chicago Board Options Exchange, in the 1970s, created standardized contracts and transparent pricing. Dealers were opposed to the change, but what they lost in pricing they made up many times over in volume. The same thing could happen in the annuities markets.

Other solutions. As we indicated earlier, employer-managed life annuities are the only payout option (within the confines of the DC structure) that eliminates mortality risk by spreading it over a population of plan participants on a fairly priced and sensible basis. But not all sponsors are going to offer annuities to their employees, and—at least for the foreseeable future—any commercial annuity

offered is likely to be very expensive. Moreover, we hear anecdotally that participants do not annuitize a large portion of their balances even when given sensible opportunities to do so; clearly we need to spend some effort encouraging annuitization in such cases.

But for all of these reasons, other payout phase options need to be discussed:

- Fixed-term level-payment annuity (or laddered bond portfolio)
- Inflation-indexed fixed-term annuity (or laddered TIPS portfolio)
- Mix of a fixed-term annuity and a conventional investment portfolio
- Conventional investment portfolio only

A *fixed-term level-payment annuity* is just a fixed-income security in which principal and interest are paid to the investor so that the principal is used up by the maturity of the instrument. It is like a conventional home mortgage in reverse.²⁷ Despite "annuity" in the name, there is no spreading of mortality risk as there is in a life annuity. For example, with Treasury bond yields at 4.8%, a 20-year level-payment annuity can generate annual cash flows equal to 8.0% of principal. Fixed-term level-payment annuity products, collateralized by a laddered portfolio of Treasury bonds, are under development by major investment management firms.

A laddered bond portfolio achieves the same cash flows as a fixed-term level-payment annuity, but can be constructed by the retiree (or his or her broker or investment manager). It requires intensive management and a reasonably large account balance to make it work in an individual's portfolio. A number of prosperous investors use this technique.

Either a fixed-term annuity or a laddered bond portfolio can be done on an inflation-protected basis, using TIPS as the underlying reference point or asset. And either a fixed-term or life annuity may be combined with a traditional investment portfolio to meet the needs of investors who want to guarantee a given level of income, while maintaining discretion and control over the remainder of their accumulated life savings.

Investment portfolio only. This is the solution that most retirees will wind up with (for now), so let's apply the general principles of portfolio theory outlined earlier. The portfolio should be an efficient combination of asset classes, with alpha added as best one can, at a conservative risk

level. BGI's LifePath post-retirement fund adheres to these principles, with the fund for U.S. participants holding 35% in equities, 55% in nominal bonds, and 10% in TIPS.²⁸ A parallel BGI LifePath fund for British retirees has 55% in British inflation-indexed bonds and may represent an even better structure, given retirees' concerns about unexpected inflation.

Having invested in such a fund, retirees must (with the help of educational materials and counselors) determine their withdrawal rate, and they face the possibility of running out of money. An advantage of these funds is that they have higher expected returns than any fixed-income-only strategy; the offsetting disadvantage is that if markets trend badly, the withdrawal rate may need to be sharply curtailed.

Retirees who do not have access to pre-mixed asset allocation funds with an in-retirement risk level can build a similar portfolio themselves, out of asset class components (both index funds and actively managed funds). One way to obtain guidance in doing so is to mimic what large, reputable investment houses are providing in their in-retirement asset allocation funds. The key, as usual, is to maximize return, subject (in this case) to a tight risk budget, while controlling costs, and being mindful of the need to hedge against inflation.

With up to 76 million retirees seeking solutions, we are confident that the investment management and insurance industries will come up with innovative products, including some that we can't describe because they haven't been invented yet. Would-be retirees should look forward to these innovations, but should be wary of costs and remember it is not possible to get something for nothing; financial engineering cannot create wealth, it can only distribute risk more optimally.

CONCLUSION

From the standpoint of the individual citizen, figuring out how to spread the income from one's working life over his or her entire life is the most important challenge in the whole field of finance. The traditional mechanism for doing so, the defined benefit pension plan, is falling on hard times (we hope temporarily).²⁹ The currently dominant alternative mechanism, DC plans, stumbled into the task by accident: They were originally designed to supplement DB plans, not to replace them. DC plans are not now doing the job even remotely adequately. With the improvements we've

suggested, however, they can be made to work better, for a larger number of participants.

The contribution component. Like losing weight (all you need to do is eat less and exercise more), saving money is simple but not easy. DC-plan participants need all the help they can get in boosting their contribution rates to levels that will enable them someday to retire at a reasonable income replacement ratio. Automatic enrollment, auto-escalation, and clear and honest communication about retirement needs and required savings rates are among the tools that are now available to help them. In addition to information about savings rates, communication to employees must convey the extraordinary cost, in terms of potential retirement income foregone, of borrowing against the plan or of otherwise spending one's balance or any part of it before retirement. As these tools are refined and new ones developed, we encourage employers to adopt them. Most DC participants simply cannot achieve the required contribution rates without these kinds of support.

The investment component. We in the investment management industry owe it to our ultimate clients, the plan participants, to provide as good an investment product as we would purchase for our own personal accounts. The centerpiece of any DC plan should be a low-cost, well-engineered portfolio on the efficient frontier, broadly diversified across asset classes. A spectrum of risk choices along the frontier should generally be offered. The asset classes within such a portfolio can be represented by a mix of index funds, risk-controlled active funds, and carefully chosen traditional, higher-risk actively managed funds. Participants should also be enabled to build their own portfolio mixes out of these high-quality component parts.

The payout component. Payout is harder because of the lack of life annuity choices that are attractive from a cost standpoint. Much as we'd like to replicate the broad mortality risk sharing of a DB plan, and provide the employee with a check every two weeks for the rest of his or her life, we can't quite get there. But there are helpful tools, including fixed-term annuities and conservative, post-retirement versions of traditional diversified asset mixes. We expect further innovation from the investment community in this regard.

With access to this set of tools, the task of saving enough money to retire is much less daunting. As we've shown in simulations, aggressive saving and a long accumulation period, combined with sensible (even cautious) estimates of future market returns, can lead to large plan

balances, enough to replace one's pre-retirement income or possibly do even better. These practices should become standard. Those cruises and golf resorts—or bass boats—may not be out of the question after all, but it will take concerted effort on the part of the investment management industry, plan sponsors, and plan participants to get there.

ENDNOTES

¹This article is a shorter version of Waring and Siegel [2006], and expands upon and updates Waring, Harbert, and Siegel [2001], and Waring, Siegel, and Kohn [2004]. The first article focuses on the poor returns earned by DC-plan participants, and the second highlights the risky asset allocation choices made by participants. Here, we integrate the two sets of concerns. Earlier works, including Waring and Assaf [1992], and Waring [1994], describe families of pre-mixed asset allocation funds that are on the efficient frontier by design (today, usually called “lifestyle” or “life-cycle” funds), and promote them as the basic building block of a sensible DC investment product line. To the best of our knowledge, Waring and Assaf [1992] is the first description of this tool in the literature, and since it draws on work performed by Waring and presented to clients and at conferences as early as 1989, we believe that lifestyle funds may owe their origin to this effort. If others were independently working on the concept before then, which wouldn't surprise us, we'd like to know about it.

²After-tax contributions are rare but they exist. In 2001, as reported in Holden and VanDerhei [2001], some 7% of employees made after-tax contributions, and 3% of all contributions (in dollars) were after-tax.

³If, as shown in Waring, Siegel, and Kohn [2004], a 9% savings rate will generate a 41% retirement income replacement rate under the return and tenure assumptions therein, then (by simple extrapolation) a 15% savings rate will generate a 68% replacement rate, within striking distance of the 75% usually considered desirable—and we've left out income from Social Security. Thus a 15% savings rate is a reasonable round-number goal, again assuming long tenure, no spending out of savings, and robust returns. Lower-income employees can get by with a lower savings rate, since Social Security will replace a larger fraction of their income.

⁴Extraordinary circumstances might include: a wealthy employee or one with a wealthy spouse, or who stands to inherit a large sum of money; or a plan with a very high contribution maximum (these are sometimes found in self-employment and small business situations, and in some nonprofit organizations).

⁵Some employees who are otherwise poor savers have considerable home equity, which they can tap by moving from a more expensive home to a cheaper one; and this strategy is

often adopted by retirees. However, home prices fluctuate; retirees have varied housing needs, some of which can be very expensive (such as assisted living). In sum, one should not regard home equity as a substitute for liquid financial assets.

⁶A similar decline occurred in 1973–1974, and a 34% decline took place in 1987. “Ordinary” bear markets of 20%–25% have occurred more frequently. The granddaddy of all market declines is the 83% drop from the 1929 peak to the 1932 low (calculated on a total return basis—that is, including dividends—for the S&P 500 from month-end August 1929 to month-end June 1932; the daily Dow Jones Industrial Average, not including dividends, fell 89%).

⁷Note that a market does not have to be efficient for it to be a zero-sum game with respect to producing alpha relative to a benchmark. The zero-sum nature of active management is a mathematical property that is completely independent of whether the assets are fairly priced (that is, whether a given asset market is efficient).

⁸Waring, Whitney, Pirone, and Castille [2000], and Waring and Siegel [2003] describe appropriate approaches to achieving alpha in a portfolio of managers.

⁹This last point is important, meriting a separate article. A brief treatment is in the sidebar entitled “Company Stock in the DC Plan — Boon or Bane?” in Waring and Siegel [2006].

¹⁰Our hypothetical worker is atypical in that younger workers usually earn less than the median income, and older workers usually earn more. In addition, he is never unemployed. It is also unusual for the entire family income to be earned by one worker. We regret any misunderstanding caused by our referring to the worker as male. It is also fortuitous for our example that stocks began and ended the 1965–2005 period at a price/earnings ratio of about 20, and that bonds began and ended the period at a yield of about 5%. Return data are used by permission of Ibbotson Associates. Income data are irrespective of family size (they are not the higher “four-person family income”) and are from <http://nces.ed.gov/pubs98/yi/y9616a.asp> (through 1993) and <http://www.huduser.org/datasets/il/il05/HUD-Medians-2005Notice.pdf> (for 2005, footnote 1, Census data). The authors interpolated the missing data, and extrapolated the 2005 datum to 2006 using a 3% growth rate. A 60–40 portfolio of S&P 500 stocks and intermediate Treasury bonds is not optimal, but it is representative of what could have been obtained through index funds over most of the period.

¹¹See Waring and Siegel [2007] for a detailed discussion of the Insurance Principle, the principle by which mortality risk is hedged—in fact, virtually eliminated from the participant's point of view—through the use of annuities or the annuity-like payout from a DB pension plan.

¹²Investment Company Institute (2005).

¹³A relatively recent Hewitt Associates 401(k) study indicated that, at the time the study was conducted, over three-quarters of plans used a very conservative 2% or 3% as the

default contribution rate. Fewer than 8% of plans that implemented automatic enrollment did so at a 5% or greater contribution rate level. See Hewitt Associates (2005).

¹⁴Warshawsky [2007], citing survey data compiled by Watson Wyatt.

¹⁵*Chicago GSB Magazine*, University of Chicago, September 2004.

¹⁶Note that all of these asset classes except nominal bonds are “real” assets, which hedge against inflation and tend to preserve and grow the real (inflation-adjusted) purchasing power of capital. Even equities are real assets, but they do not hedge inflation effectively in the short run, while most of the other real assets do. Since retirees consume in real terms, real assets (other than equities) make sense for DC-plan investors, and investing at least some portion of one’s savings in them should be encouraged.

¹⁷See Appendix C (pp. 101–103) of Waring, Whitney, Pirone, and Castille [2000], and, for a less technical treatment, Waring and Siegel [2003].

¹⁸Carhart [1997], among others, found that there is a negative relation between fees and performance. In other words, high-fee funds have lower before-fee performance than low-fee funds.

¹⁹ETFs do not carry as low a fee as institutional index funds, but they are competitive with retail index funds and come in a much wider variety of benchmarks. Many sponsors find them a convenient tool for providing full choice across asset classes in an indexed form.

²⁰The baby boom in the U.S. is generally considered to have lasted from 1946 to 1964, and involved 76 million births. A person born in 1946 will reach age 65 in 2011; a person born in 1964 will reach age 67 (which will then be the age at which one receives full Social Security benefits) in 2031. Note that these are the starting years of what is (hopefully for the participant) a long period of living on one’s retirement income. The 76 million number is a little exaggerated, since some of those born never worked, have already retired, or have died.

²¹We recognize that bequests have value. However, it is understandable that a retiree who is trying to squeeze the last possible dollar of income out of his or her savings might overlook this value. Our analysis in this section thus ignores the bequest value of savings not consumed within the saver’s lifetime.

²²For the annuity calculation, see Waring and Siegel [2007] and the RPA 2000 mortality table, which is also mandated by the Pension Protection Act. It has mortality improvement projection through 2014. They assumed a yield of 4.8% for Treasury bonds of all maturities, for both the annuity and non-annuity calculations.

²³Commercial annuity providers also introduce an element of default risk into one’s portfolio, suggesting that, at a minimum, some diversification across providers is in order.

²⁴The extreme lower end of annuity fees that we are aware of as we write this (inclusive of investment management fees,

sales charges, and mortality charges), is 0.5% per year. This is quite low relative to most annuities, but note that an active bond fund at institutional size might be as low as 0.15%, and that with a large-enough universe and with unbiased life tables the mortality costs will approach zero by virtue of the life insurance principle. Note, also, that expenses are not the only variable needed for the consumer to compare annuity deals: The realism of the mortality tables, the extent (if any) to which payouts are adjusted for realized mortality experience, and other variables may also be very important, depending on the terms of the annuity.

²⁵We realize that a sponsor who starts a self-administered annuity payout may be subject to accounting and regulatory requirements similar to those of a type of DB plan (a cash balance plan) in which the sponsor takes no investment risk but does take residual longevity risk. One such plan with which we are familiar is in fact legally structured as a cash balance plan, and pays the per capita PBGC premium as any DB plan would. The plan is also required to report its funded status and other variables. We don’t have specific knowledge, but other structures that provide a self-administered, annuitized payout may be permitted. We do not think we are asking too much of sponsors to suggest that they incur some compliance and PBGC-premium costs to provide their employees with this tremendous benefit.

²⁶Data obtained from Hewitt Associates by the authors.

²⁷By “in reverse” we simply mean that with a fixed-term level-payment annuity, the consumer, or investor, first pays the lump sum and then receives periodic payments, while with a mortgage, the consumer first receives the lump sum and then pays the periodic payments.

²⁸Data as of March 31, 2006.

²⁹Waring and Siegel [2007] describe an approach to managing defined benefit plans on a financially and actuarially sound basis. The approach involves holding assets that hedge the market-related (mostly duration) risks in the liability, then take equity or other risk incrementally to that hedged position to try to earn a higher rate of return. The plan should also be fully funded, to the extent it is practical to do so. Our expectation is that DB plans managed according to this approach will not experience the volatility and underfunding problems that are currently motivating companies to “freeze” their DB plans.

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