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BE KIND TO YOUR RETIREMENT PLAN – GIVE IT A BENCHMARK

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I. Introduction: Why retirement plans need a benchmark

Target-date funds have become one of the most popular vehicles, if not the single dominant one, for defined-contribution plan (DC) investing. As such, they are one of the three pillars of retirement, the others being Social Security and private savings.[2]

Under the Pension Protection Act of 2006, target-date funds are considered a Qualified Default Investment Alternative (QDIA), thereby receiving special legal protection. Specifically, they are a safe harbor, in which the plan sponsor is relieved of fiduciary responsibility for the funds' investment performance.

Consequently, target-date funds are very important. They are deserving of institutional best practices. The first step in bringing institutional-quality technology to bear on managing these funds is to give them a benchmark—a passive, rule-based portfolio to which the performance and risk of the actual target-date portfolio can be compared. Yet, in the asset accumulation phase, benchmarking of target-date funds has just barely begun. In the trickier decumulation phase, there is essentially no relevant benchmarking at all.[3]

What are we thinking? QDIA target date funds are risky and complex financial products, on which many people depend for essentially their whole livelihood after retirement. They are more than just a portfolio. They are time-varying schedules of risk, embodying theories of how an individual investor's risk tolerance is supposed to

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[2] As of this writing, in 2012, DB plans are essentially gone except for public-sector workers.

[3] While benchmarks exist for the "in-retirement" tranches of target-date funds, we argue later that they are not relevant because they do not address the investor's problem in decumulation, which is to maximize income at the lowest acceptable level of risk, subject to concerns about inflation and about outliving one's money. Sexauer, Peskin, and Cassidy (2012) present such a benchmark, and we suggest, later in this article, that it is the only *relevant* existing benchmark for decumulation.

change over time—and they are designed to do this, working on autopilot, for a large fraction of the 139 million working Americans and 55 million retirees.

Whose job is it to determine which risk schedule matches the needs of each person? That's the job of the fiduciaries—the plan sponsor and his or her advisors and consultants. Each plan fiduciary is expected to make these risk decisions for thousands of employees, sometimes hundreds of thousands. Yet, at this stage, the industry (fiduciaries, advisors, and companies) is going about this task without the most basic tool used in every other investment context: a benchmark.

This essay is about benchmarks, why they are good, and how their use in QDIA portfolios will improve outcomes for investors, sponsors, and financial providers.

Briefly, benchmarks are valuable because they provide a common language for discussion of the risks taken by an investor, as well as serving as a measuring stick for performance. Before saying how benchmarks can and should be applied to the specific problems of DC-plan asset accumulation and decumulation, we briefly review the concept of a benchmark and indicate why benchmarks and benchmarking are good for the investment process.

II. What's so great about benchmarks?

Away from QDIA portfolios, investors have benchmarks for just about everything. Benchmarks make it possible for investors to:

- Judge whether their performance is good, bad, or mediocre;
- Evaluate various market and other risks using a shared lexicon that includes specific metrics for risk and return; and
- Directly adopt the investment strategy represented by the benchmark (by indexing to it) if they choose not to try to outperform it.

Let's show briefly how a benchmark can be used to help QDIA investors. In the crash year of 2008, target-date fund "TDF" returned -20%. Is this return good or bad?

Since the U.S. stock market fell 37% that year, a loss of only 20% sounds pretty good. But the bond market went up in 2008. Fund "TDF" was branded as a "target 2015" fund. We cobbled together a simple illustrative 35/65 benchmark (the low equity percentage because the seven-year time horizon of the fund corresponds to a fairly conservative strategy), and found that the benchmark return was -9.54%. Thus fund "TDF" had poor performance.

Benchmarks are somewhat controversial, because some investment managers—and even some customers—object to being measured or because they believe that the use of benchmarks causes capital to be allocated inefficiently. We believe that benchmarks are good, a key tool that almost unequivocally adds value. We will briefly address critiques of benchmarks later in this section.

A good way to think about benchmarks is that they are portfolios that have the same general investment goals and characteristics as what's being benchmarked, but with no active bets. They are the portfolio you would hold if you had no active view on anything.

A good benchmark generally has the following characteristics:

1. It is representative of the asset class or investment strategy that is being benchmarked.
2. It is passive, needing little or no judgment on the part of the user.
3. It is investable and tradeable.

Because only market capitalization-weighted benchmarks are self-rebalancing as described in item (2) above, such benchmarks are generally considered the gold standard. "Cap" weighted benchmarks have the added advantage of being mean-variance efficient from the viewpoint of the capital asset pricing model. There are, however, circumstances under which "cap" weighted benchmarks are impractical or inappropriate.[4]

Objections to benchmarks. While almost all investors use benchmarks, at least for performance measurement, there has recently been an anti-benchmark movement. Its advocates ask, for example, "If your U.S. equity portfolio is down 25%, are you really comforted by the fact that its benchmark, the S&P 500, is down 30%?" We would say yes. A decline in the S&P 500 can be easily and cheaply hedged. If the investor wants a return that is unrelated to that of the benchmark, he or she should hedge out the benchmark return, leaving only the alpha (in this case +5%). Thus, this manager's 5% outperformance relative to the benchmark can be realized; you can "eat" relative performance.[5]

Others argue that cap-weighted benchmarks have too large a weight in overpriced, "mega cap" stocks, and that the use of such benchmarks causes too much capital to be allocated to these companies. This assertion should be viewed as a claim by the speaker that he has skill in active management—value investing in particular—and can beat the benchmark by holding less than cap weights in stocks he believes are overpriced. Since most active managers (including value managers) do not beat their benchmarks, there is very little evidence to support the claim that cap-weighted benchmarks are inefficient or out of balance.

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[4] A comprehensive discussion of benchmarks is in Siegel [2003]. A focused discussion of benchmarks by asset class is in Enderle, Pope, and Siegel [2003], and Schoenfeld, Handley, and George [2001].

[5] For further discussion of the objections to benchmarks, see Waring and Siegel [2006].

III. Using benchmarks to resolve difficulties in communicating with investors

Part of the value in using benchmarks is in their ability to facilitate communication among investors, fiduciaries, and others. For example:

"For the 12 months ended April 30, 2012, mutual fund 'Z' returned -1%."

This statement conveys a quantum of information but it is completely out of context. How about:

"For the 12 months ended April 30, 2012, the U.S. small cap value mutual fund 'Z' returned -1%, compared to -4.06% for its benchmark, the Russell 2000 Value index. The fund had a beta of 0.8 relative to its benchmark, and an alpha of 2.25%."

Feeling better about your decision to have stayed in fund "Z" over this past tumultuous year? We thought so. The fund is a winner, not a loser. The context provided by the benchmark allows for relevant return comparisons, risk comparisons, and classification of funds or securities into the right asset class.

So you think you know what risk is…

Communication among investors and other involved parties is made much harder by the fact that, while most people can agree on what they mean by "return," almost no two people can agree on what "risk" is. To determine whether concepts of risk were being communicated clearly between principals and fiduciaries, in our travels among investors and investment managers we posed two questions to over 100 respondents:

- What does risk mean to you?
- What does risk mean to your client?

We found that the answer to either question, unvaryingly, had three characteristics:

1. The investor's or manager's definition of risk contains the idea of "down," or money "lost"—something generically thought of as bad. That is, risk is asymmetric.

   (The idea that risk is the possibility of a large positive *or* large negative return would mean that risk is *symmetric*. We never heard this answer. Note that this is the answer implied by Markowitz efficient-frontier optimization.)

2. The communication—the framing, the choice of words, the lexicon (that is, way that each word is defined)—is custom, personalized to each respondent.

   (Responses are typically quirky rather than prosaic. An example of a quirky response is to define risk relative to separate mental accounts: risk is when a bond or money market fund is down at all, but when a stock fund is down by

more than 25 or 30 percent. It's also when a liability—an obligation or bill—is substantially larger than expected.)

3. No two investors can agree on a single metric of risk, such as loss of 20% of capital, or not being able to retire at 65, or living on only 30% of one's final salary, or only being able to live on 70% of final salary for 20 years before running out of money. Each respondent has his or her own metric, or combination of metrics. Sometimes, a metric is never used in the discussion of risk.

We are pretty sure that these results would hold over a larger sample of investment professionals. This cacophony strongly suggests that what is needed is a common definition, a common lexicon, and common metrics for defining, communicating, and measuring risk—especially when discussing QDIA portfolios, to which industry-standard risk technology has rarely been applied. That is what a benchmark does, and is what clearly-articulated benchmarks have been doing for decades in the mandate-specific world of institutional portfolio management.[6]

What's special about risk analysis for QDIA portfolios?

In a traditional investment setting, risk analysis tends to be very focused: risk consists of market risk and tracking error. In other words, there are two separate and separable risks: (1) the risk inherent in the benchmark, and (2) the risk of deviating from the benchmark. In QDIA portfolios, however, risk analysis becomes more complex and the demands on our language and on our skills become greater.

In the wealth-accumulation phase, an investor typically buys shares of a target-date portfolio that exposes him or her to a specific schedule or timetable of risk. The amount and kind of risk changes year-by-year for something like 40 years. The accumulation phase requires answers to three important questions, which are not at present uniformly or clearly answered:

- What is risk?
- What lexicon is used to describe the risk?
- What metrics are used to assess the risk?

During the decumulation phase, the risks are different; you need income, not assets. Hence, decumulation portfolios are retirement income portfolios—portfolios that

[6] By a "mandate" we mean a highly specific description of a fund's intended investment universe, such as "U.S. small-cap value" in our earlier example.

need to last an uncertain lifetime, ranging from one to perhaps 40 years after retirement. There are four interconnected risks in decumulation:

- Longevity risk. (The chance of outliving one's assets.)
- Counterparty risk. (The counterparty—company or government—might fail.)
- Investment risk, including inflation risk. (Realized returns can be far below expected or planned returns, either because of underperforming markets or unexpected inflation.)
- Liquidity risk. (Can I get to my money easily, quickly, and cheaply?)

In the following sections we indicate how the wise choice of a benchmark in each phase, accumulation and decumulation, makes it much easier to make sound investment decisions and to align the interests of the investor with those of the sponsor and other fiduciaries.

IV. Benchmarks for accumulation portfolios

Despite claims (presumably true) that a great deal of Ph.D.-level brainpower has been expended by each target-date fund family in the search for an "optimal" or "best" glidepath, there is no such thing. Theory strongly suggests that the glidepath should be tilted downward, from a relatively high exposure to financial risk early in life to a lower level of risk as one ages.[7] Appendix A portrays the development of the theory that supports the idea of a downward-sloping glidepath. But the starting point, ending point, and speed of risk reduction over time are matters of judgment. (Markowitz optimization helps with determining the exact asset mix at any given point in time.)

Sexauer, Pietranico, and Siegel (2011) document the wide range of asset mixes used by target-date fund providers. They suggest that the imprecision that necessarily surrounds asset-allocation inputs makes it impossible to determine, other than within a broad range, what portfolios are efficient—and prudence dictates that it's best if the fund provider errs on the side of too little risk. Thus, the optimal glidepath is a cloud, and if one is going to adopt a benchmark for one's target-date funds, the benchmark glidepath should follow the lower boundary of the cloud.

Why do target-date funds need benchmarks? As we noted earlier, a benchmark's risk and return provide a context for the return on a portfolio. Let's look a little more carefully at our Crash of 2008 example. Target-date fund "TDF", which is a "target 2015" fund, was drawn from a real-life sample of seven "target 2015" funds having returns for the year 2008 ranging from -43% to -8%—a stunningly wide range for a

[7] See Bodie, Samuelson, and Merton (1992).

category of funds holding up to thirty-eight years of accumulated savings that will need to be converted into income in only seven years!

In the "target 2015" fund example, the use of a benchmark would make it clear to sponsors and investors just how much risk exposure their 2015 fund contains. Those who view the seven years prior to retirement as high-sequencing-risk years would not choose a benchmark for which a loss in the range of 40% is even remotely possible.[8]

Let's show how we built the simple illustrative benchmark for "target 2015" funds that we briefly discussed earlier. An investor with seven years to retirement is typically 58 years old. The heuristic of "the percentage in equities is 100 minus your age" produces a result of 42% in equities, and reducing this amount further due to our observation about sequencing risk produces a benchmark of, say, 35% in equities (the S&P 500, for simplicity's sake) and 65% in bonds (the Lehman/Barcap Aggregate index). In 2008, this benchmark returned -9.54%.

Clearly, for a fund with a target date only seven years away, a return of -40% for that year falls somewhere between deep disappointment and outright negligence (and we're being nice). A return of -8%, slightly better than that of the benchmark, suggests that the manager was paying attention to the near-retirement investor's needs. Without access to a benchmark that was designed around this investor's needs and objectives, one might think that a -40% "target 2015" fund return was acceptable because the stock market was down 37%) or that a -20% "target 2015" fund return was very good indeed, when in fact it would have been quite poor.[9]

A recipe for fiduciarily responsible target-date fund selection. When recommending a target-date fund to a pool of investors, the plan fiduciaries (trustees and their advisors) select a benchmark and a glidepath, and therefore the risk profile for every investor who defaults into the target-date fund program for a period of up to 45 years. This benchmark is one that, in the fiduciaries' judgment, provides the appropriate specific year-by-year asset allocation and associated risk schedule. These parameters can now be clearly communicated and made accessible to all the parties in interest: trustees, advisors, consultants, and let's not forget the plan participants—it's their money.

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[8] Sequencing risk refers to the risk of a target-date fund in the final five to ten years prior to retirement, a period when the compounded returns on the large balance are important (and typically underappreciated) and large losses can bring catastrophe.

[9] It took real talent to lose 43% in 2008, given that the S&P 500 was down "only" 37%. Several categories of international equities had worse returns, but all categories of bonds and cash had better returns, and nominal Treasury bonds of all maturities were *up* in 2008.

With the benchmark asset classes and weights in hand, a target-date fund can thus be treated like any other active portfolio:

- The expected volatility of the portfolio can be calculated
- The expected income can be measured
- Active decisions can be seen and measured, and tracking error calculated
- The benefits of tracking error (active return) can be weighed against active risk
- Standard *ex post* performance attributions can be done
- The investor can index—that is, hold the benchmark instead—if he or she chooses.

Currently there many accumulation benchmarks to choose from. Most represent well-diversified asset mixes that vary risk overtime (a QDIA glidepath benchmark), or they offer static risk profiles (a QDIA balanced fund benchmark). Sponsors and their advisors should research these benchmarks, and choose and use one of them. If you are a plan sponsor, choose the benchmark that, in your judgment, best meets the needs of your employees, who are delegators of authority and who will be defaulting into the QDIA that you choose for them. They will appreciate your diligence when they retire, if not before that.

Some readers may wonder why we don't propose our own benchmark or family of benchmarks for wealth accumulation. One reason is that there are already many to choose from. More importantly, however, each investment situation requires thought as to what benchmark is the most suitable for that plan, so a single "canned" answer is inappropriate. As Sexauer, Pietranico, and Siegel (2011) argue, a conservative benchmark (one with relatively little in equities and other risky assets) is to be preferred in many situations, especially where the QDIA portfolio is the only substantial asset an investor has. But an aggressive benchmark can be appropriate too. For example, we analyzed the situation of a large multi-national company's employees and it turned out that most of them were long-service and were covered by a generous DB plan. Thus, the DC plan was truly supplementary, and it seemed prudent to expose them to as much upside as possible.

V. Benchmarks for decumulation portfolios

In retirement, we all have much more in common: We all need to convert our assets to income, we all gain from longevity pooling, we all need inflation protection, and almost all of us put a high value on liquidity. The question now becomes, what is the appropriate benchmark that does all these things?

When an actuarial firm takes on an institutional mandate, the first task will be to determine the schedule of the retirement-income promises made to the employees by the company (or by a government or industry scheme). Funding this schedule and

managing the assets matched to it are the objective: The liability schedule is the benchmark.

Individuals also have a liability schedule: It is their planned spending in retirement.[10] As we just noted, many of the dimensions of this schedule are common to all of us.

In general, finance provides a rich theoretical basis for deciding what the benchmark should be in most situations. The easiest example is a U.S. equity portfolio. The natural benchmark for such a portfolio is a capitalization-weighted combination of all of the liquid, publicly traded stocks in the U.S. market, because such a benchmark is (1) macroconsistent (everyone could hold it if they chose to, without any stocks left over); (2) self-rebalancing, so that there are no transaction costs caused by ordinary price changes, only by index reconstitution; and (3) mean-variance efficient according to the capital asset pricing model. A cap-weighted benchmark is also risk-minimizing in the sense of having no alpha risk (that is, no risk other than that presented by the asset class itself).

There is, however, no theory saying what the benchmark should be for a given client in decumulation. Or it might be more accurate to say that the investment community is still debating what the right theory is. A conversation on this topic could easily migrate among the following benchmark concepts:

- LDI – liability-driven investing, that is, choosing assets to match the cash flows in the liability
- A conventional multi-asset-class portfolio benchmark, of which 60/40 (equities/bonds) is the simplest example
- 100% in U.S. Treasury inflation-protected securities (TIPS)
- A benchmark based on nominal or real annuity payouts
- One of the several benchmarks for target-date funds, as discussed in section IV.

We believe that the right theory is based on LDI, with extra wrinkles to reflect the special investment problems of individuals. The benchmark that we recommend for decumulation is, ideally, one that minimizes the four dominant decumulation risks: longevity, investment (including inflation), counterparty, and liquidity. It should also be an executable and indexable portfolio. One benchmark that does this is the

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[10] At the first level of analysis we can treat spending plans in retirement as exogenous, like a pension liability that is contracted for independently of the assets reserved to pay it. However, since one can only spend what one has, retirement spending for the individual is more accurately portrayed as endogenous (determined by savings rates and investment results). A fuller analysis would take this endogeneity into account and would also distinguish multiple spending levels that one can plan for in retirement, such as survival, comfort, and luxury levels of spending. See Waring and Siegel (2012); antecedents are in a number of commercial retirement planning products or service descriptions, including those of UBS and Advisor Software Inc.

DCDB™ Benchmark (see Appendix B), and it can be found at http://www.DCDBBenchmark.com.

First introduced by three of us (Sexauer, Peskin, and Cassidy) in a January/February 2012 *Financial Analysts Journal* article entitled "Making Retirement Income Last a Lifetime," this benchmark consists of only two assets:

1. A self-liquidating, laddered portfolio of TIPS with maturities up to 20 years, providing retirement income from ages 65 to 85; and
2. A deferred annuity with payments starting at age 85, and scaled so that the first deferred annuity payment is expected to be the same, in real terms, as the last cash flow from the TIPS portfolio.

(These ages are only examples. A benchmark can be constructed along these principles for any retirement age and any annuity deferral period. Thus this benchmark is properly viewed as a *family* of benchmarks, one for each retirement age, gender, and so forth.)

Because of the long wait to receive the deferred annuity payments, and because of high mortality after age 85, the cost of the deferred annuity is surprisingly small, leaving most of the portfolio in liquid TIPS. For a 65-year-old male in the United States in 2010, the portfolio weights were 88% in the laddered TIPS portfolio and 12% in the deferred annuity at the time the strategy is initiated (that is, at age 65).

We call the family of benchmarks that use this structure "DCDB," for "defined-contribution decumulation benchmark," but the acronym is also supposed to connote "DC to DB," defined-contribution to defined-benefit, reflecting our conviction that a well-engineered DC plan should be experienced by the participant much like a DB plan, providing predictable in-retirement income and having very little risk.

This benchmark has minimal risk. It provides inflation protection through age 85, does not contain any equity risk or fixed income duration-mismatch risk, and only the deferred-annuity cash flows starting at age 85 have any credit risk. To further reduce inflation risk would require annuitizing the whole investment balance in a real (inflating) life annuity, but this would expose the whole portfolio, instead of just 12% of it, to credit risk, and would be unacceptable to most investors because of the liquidity loss.

Many of the millions of retirees may find greater utility in a different portfolio, say, one that contains equities or one that contains income guarantees. But these investors need a way of measuring the success of their portfolio, and the DCDB™ benchmark provides such a way, by revealing the cash flows that can be generated each year per $100,000 invested, without taking any equity risk and while also taking advantage of longevity risk pooling from age 85 onward (which are the years when the pooling has the largest payoff).

VI. Summary

Plan sponsors, consultants, advisors, and participants can use a benchmark to define, evaluate, and judge QDIA target-date portfolios. They will know why a particular glidepath was chosen, and what its attendant risks are. They will have access to the relevant risk and return performance metrics. As now required by the U.S. Department of Labor, they will know now much retirement income their target-date portfolio can generate.

For accumulation, there a many good benchmarks to evaluate and choose from. What matters is to choose and use one of them. For decumulation, the DCDB^{tm} benchmark provides a common yardstick for measuring the wide range of post-retirement income strategies available today. A risk-averse investor can also invest directly in the DCDB^{tm} benchmark, akin to indexing.

A call to action

This article is a call to action. There are two steps that fiduciaries must take. First, they must choose an overall investment strategy and risk profile by selecting a benchmark. That is, they first need to agree that the investment goals represented by a particular benchmark are suitable for the investor pool they are pledged to help.

Second, fiduciaries must choose a manager. They must evaluate candidate managers by observing how each manager's strategy takes active risk (not just security-selection risk, but asset-allocation risk that deviates from the risk of the benchmark). Fiduciaries must then evaluate the selected manager on an ongoing basis, using the benchmark's performance and risk as a measuring device for the performance and risk of the manager. Only by fully adopting all of these practices can a fiduciary execute the responsibility that he or she has agreed to take on.

Be kind to your retirement plan. Give it a benchmark.

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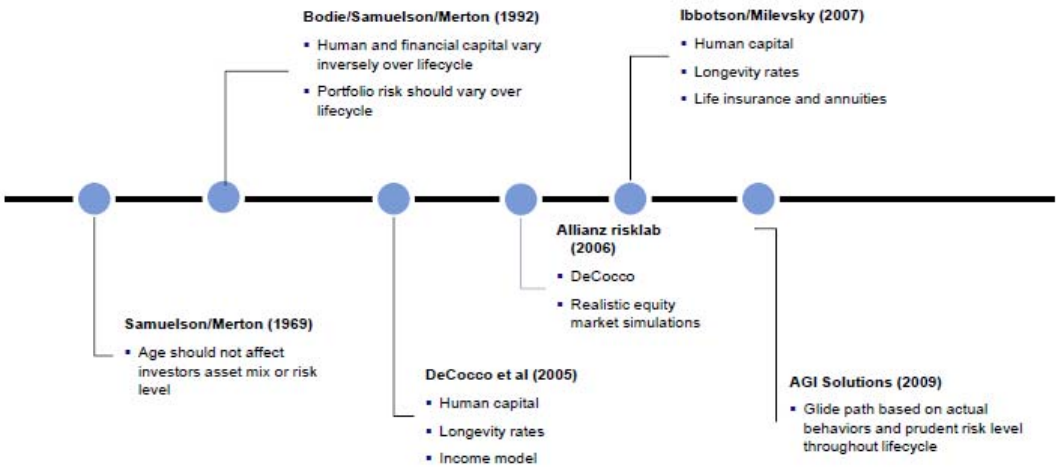
Appendix A

A Brief History of Target-Date Glidepaths

Some argue that life-cycle finance (which is the economic discipline from which target-date glidepaths arose) is the most important specialty within finance.[1] Research on optimal glidepaths goes back at least forty-two years, with many outstanding contributions to field over this period. Exhibit A shows the time line.

Exhibit A
Evolution of the Glide Path Concept



In 1969, Paul Samuelson and Robert Merton, two future Nobel Prize winners, each wrote a paper on how make portfolio selection decisions over a lifetime, with the key decision being how to split the portfolio year-by-year between risky assets (equities) and riskless assets (bonds). Their work was mathematically impeccable, but it did have an odd result: an individual's optimal allocation to equities is the same throughout his lifetime—it supposedly should never vary.

This result is so counterintuitive that it sparked considerable further work, and in 1992, Zvi Bodie joined with Merton and with Paul Samuelson's son William to add human capital—the capitalized present value of one's future wages—to the economic model used to calculate the optimal glidepath.[2] This change had a big impact on the results.

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[1] Ibbotson, Roger, Moshe Milevsky, Peng Chen, and Kevin Zhu. 2007. *Lifetime Financial Advice: Human Capital, Asset Allocation, and Insurance.* Charlottesville, VA: Research Foundation of CFA Institute.

[2] Bodie, Zvi, Robert C. Merton, and William Samuelson. 1992. "Labor Supply Flexibility and Portfolio Choice in a Life-Cycle Model." *Journal of Economic Dynamics and Control* 16, nos. 3-4 (July-October): 427-449.

Wages are far less volatile than equities and they go to zero in retirement. From the standpoint of a Markowitz optimization problem, adding wages is the equivalent of adding bonds and hence allowing for more equities in earlier years. The result is the general shape of the target-date glidepath in use today.

The next major innovation was in 2007, when Ibbotson, Milevsky, Chen, and Zhu added longevity pooling to the optimization. They used life annuities to achieve longevity pooling. The gains to longevity pooling are enormous: the average life expectancy of someone retiring at 65 is about 85, but since you might live to 105 instead, you need up 50% more in assets at retirement in the absence of longevity pooling. By explicitly modeling the gains from longevity pooling, Ibbotson and his co-authors allow for higher equity allocations and thus higher expected income.

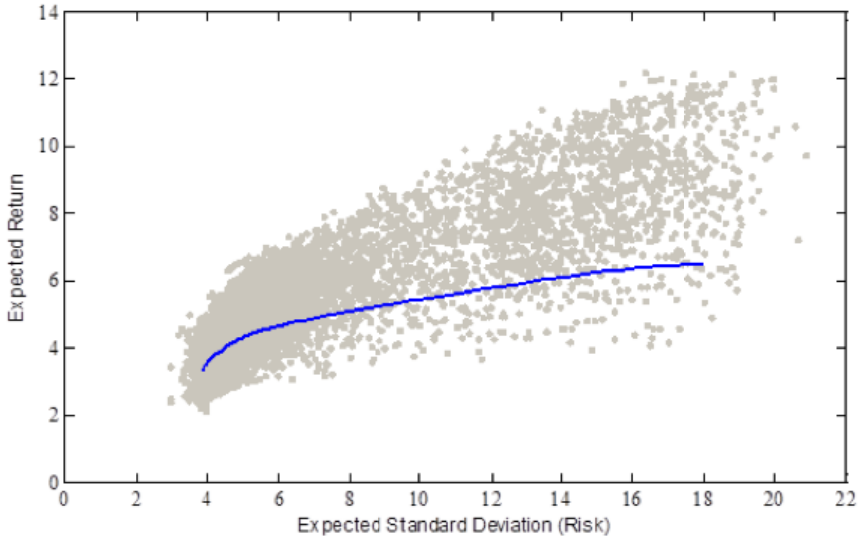
Given this rich research on glidepaths, why is it so important to have a benchmark? The last 40 years of lifecycle finance have yielded the following conclusions regarding target-date glidepaths:

- There is no single "optimal" solution for a given target date. There are many solutions, each one specific to the profile of the individual.

- An "optimal" glidepath tailored to a specific individual's profile, or to a common group profile, is almost universally represented through time as a line. The line gives the illusion of precision in the result. But the glidepath is not a line. It is a cloud of lines, and a very wide cloud at that. Each line in the cloud is "optimal" given the specific inputs that were used to construct it.

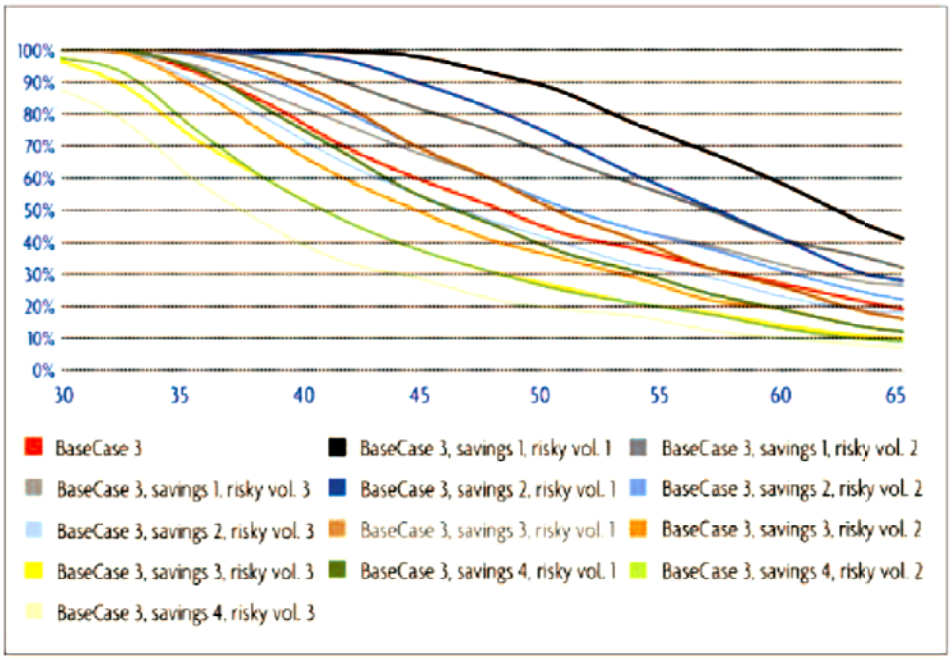
To help illustrate these principles, Exhibit B shows the cloud idea applied to one the best known concepts in finance: the Markowitz efficient frontier.

Exhibit B
Efficient Frontier of Asset Classes Portrayed as a Cloud



A similar cloud could be drawn around a target-date glidepath, where the width of the cloud reflects the degree of uncertainly involved in estimating the inputs used to construct the optimal portfolios making up the glidepath.[3] Exhibit C is a picture of a cloud of "optimal" glidepaths:

Exhibit C
Optimal Asset Mixes by Participant Age, with Joint Variation of Savings Rate and Risky Asset Volatility



	Case 1	Case 2	Case 3	Case 4
Multiple of Base Case Savings Rate	0.50	0.80	1.00	1.30
Risk Asset Volatility	10%	15%	20%	

The illusion of precision is the reason that using a benchmark is so important in retirement asset accumulation. There is no "optimal" glidepath, nor a "best" glidepath, nor a one-size-fits-all glidepath. As a result, one has wide discretion in selecting a portfolio in any given situation. A benchmark provides a measuring stick for this decision, as well as a common lexicon for discussing the various risks and investment characteristics to which an investor is exposed, as well as the risks he or she would prefer to avoid.

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[3] See Sexauer, Stephen C., Paul Pietranico, and Laurence B. Siegel. 2011. "The Illusion of Precision." *Retirement Management Journal*, vol. 1, no. 2 (Fall).

Appendix B

DCDB Benchmark Illustration

Exhibits 1 and 2 illustrate the basics of the DCDB benchmark. The year-by-year income (cash flow to the investor) generated by the benchmark portfolio, per $100,000 invested, is shown in Exhibit 1. The first 20 years' cash flows grow with the inflation rate. Starting in year 21, there are no more inflation adjustments. (The DCDB design does not include inflation-indexed deferred annuities because they are not currently available; insurance companies cannot defease the risk of issuing them because the TIPS market has no depth beyond 20 years, the same reason we cannot hedge inflation risk after the twentieth year directly.)

Exhibit 1
Expected Annual Cash Flows per $100,000 Invested in DCDB Benchmark Portfolio

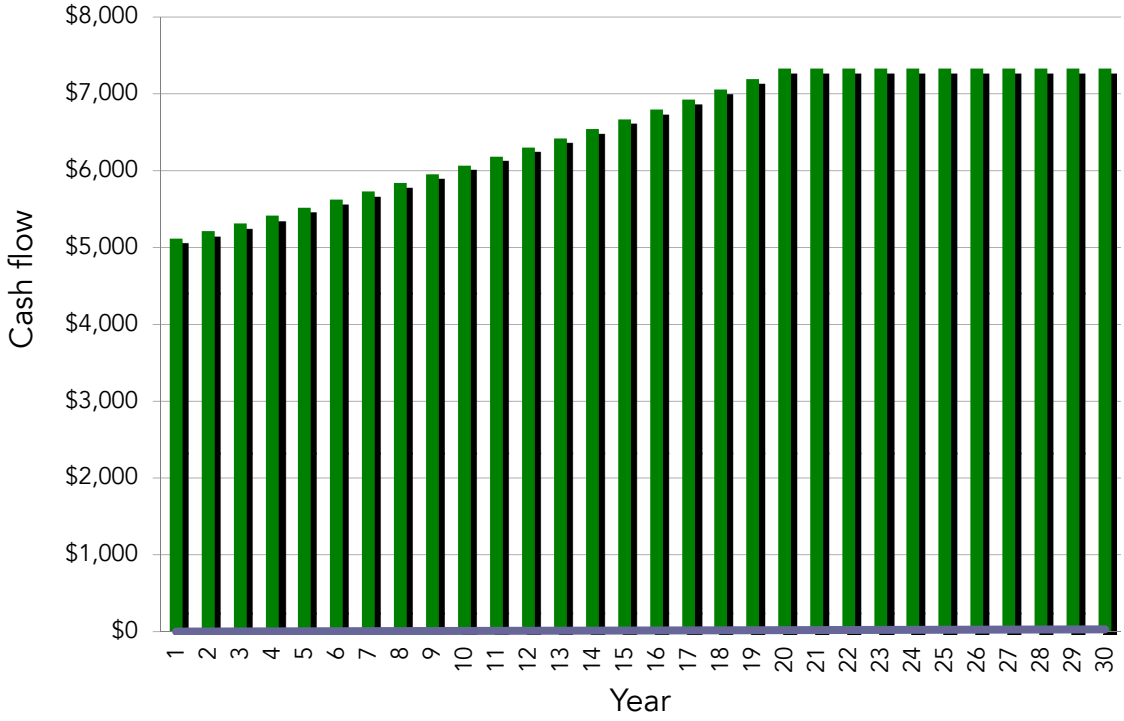

Exhibit 2 provides greater detail on the construction and characteristics of the DCDB benchmark.

Exhibit 2
Details of the Allianz DCDB™ Index for a 65-Year-Old Male as of September 30, 2010

	Allocation	
Characteristic	**88%**	**12%**
Age range over which portfolio component provides income	65-85	85+
Asset description	20-year self-liquidating TIPS portfolio	Deferred annuity starting in year 21.
Yield or annuity rate	5.69% (including return of principal)	
Annual income per $100,000 invested, years 1-20	**$5,118** in today's dollars, inflating at realized inflation rate	$ 0
Annual income, year 21+	$ 0	**$7,332 (in nominal dollars)**
How income is calculated	$5,118 = 5.69% distribution rate × 88.3% allocation × $100,000 × [1 + first year inflation]	Based on $5,118 first-year nominal income, inflated for the next 19 years at 1.91% TIPS breakeven inflation rate
Inflation protected?	Yes	No
Investor control of assets?	Yes	No

Uses of the DCDB benchmark

Investors can invest directly in the benchmark, akin to indexing. We are aware that counterparty or credit risk in the deferred annuity component is a problem. Some investors simply will not pursue the strategy because of this risk, which cannot be eliminated by diversifying among annuity issuers because defaults are correlated. However, the gains from longevity risk pooling are so large, comprising about one-third of one's whole retirement assets according to some estimates, that we believe investors are foolhardy not to invest at least a modest amount in annuity-based products.

Alternatively, investors can pursue their own strategy, presumably riskier but with a higher expected return (because we have already identified the lowest-risk strategy), and use the returns on the benchmark to gauge their progress toward their goal.

What good is an income benchmark?

Careful readers will already have noted that the DCDB benchmark specifies yearly cash flows from the investment portfolio, but not total period-to-period returns from holding the portfolio (as most other benchmarks do). The reason is that the deferred-annuity component of the DCDB is not marked to market, but carried at cost. Does this characteristic of the DCDB make it any less useful? Or is it, perhaps, an advantage?

All investment choices, including the choice of a benchmark, involve tradeoffs. DCDB is cleanly packaged, easily implemented, self-managing (buy and hold), low cost if the deferred annuity is fairly priced, and directly solves the investor's problem of guaranteeing an income for life. We agree with the general principle that, all other things being equal, benchmarks for which total return series can be constructed are best. However, the deferred annuity is so powerful in solving the investor's problem without accumulating a great deal of extra assets that we are more than willing to live with an income-only benchmark in order to incorporate this feature.

Investors hunger for a way to hedge longevity risk, but with traditional immediate annuities they cannot do so without sacrificing the liquidity and flexibility that they prize. This is why immediate annuities are so unpopular. The DCDB benchmark combines the best aspects of traditional low-risk investing and insurance.