

Evaluating Target Date Lifecycle Funds

The relatively new Target Date Funds, which are now an approved investment by the Department of Labor, have proven themselves to be a moving target for any kind of benchmark comparison. The authors offer their method for creating the Pure Target Index Series, which they define as not just hypothetical; they are totally investable. There may be differing thoughts on how to handle these investment vehicles, but most agree that standardized performance benchmarks are needed.

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INTRODUCTION

The Department of Labor's (DOL's) new rules for Qualified Default Investment Options (QDIAs) advance three investment options: Target Date Funds, Balanced Funds and Managed Accounts. "Managed Accounts" in this context means that a service provider creates diversified portfolios of the plan's mutual funds (and/or other offerings) on behalf of the participants.

Managed accounts hold promise for advisors but they require adherence to an audited prudent investment process, a process that could take years to achieve scale. Moreover, managed accounts have operational challenges in providing customized service to each investor. Thus, Target Date Funds (TDFs) are the

immediate play. Advisors will be called upon to find the best TDFs. But unfortunately, or perhaps fortunately for the opportunistic, current offerings are not as good as they could be.

The target date industry is still in its infancy and is likely to evolve very rapidly, if for no other reason than the probable stampede into these funds. The potential growth in assets committed to target date funds over the next 5 - 10 years is astounding. For example, at year-end 2006, there were 168 distinct target date mutual funds with \$109 billion in total assets (if counting all share classes, the total number of funds was over 1,200). As of October 31, there were 226 target date funds with \$164 billion in assets. This represents a 35% increase in the number of funds and a 50%

increase in total target date fund assets in just 10 months.

Even so, the ability to separate the wheat from the chaff is extremely difficult, primarily because there are no good yardsticks for gauging performance. That is the purpose of this article: to describe benchmarks that can be used to evaluate the performance of TDFs. We identify best practices in TDFs and recommend indexes that adhere to these practices. Importantly, these indexes are completely investable, not just theoretical. The reader may disagree with some of the specifics but will certainly agree that standardized performance benchmarks are needed.

TARGET DATE FUNDS

Target date funds have no guarantees; rather they provide a “set-it and forget-it” investment pattern that should serve the typical investor well. These funds are aggressive at first and then become more conservative through time as the target date draws near. The idea is to take more risk, in the hopes of higher return, when the horizon is long and account balances are low, because there is time to recover from losses through both savings and future returns. As assets accumulate and the target date approaches, asset protection should take precedence over performance. In short, there should be a shift in objective as the target date draws nearer.

An advisor’s choice of target date fund or fund family is driven by branding, fees and performance expectations. Branding and fees are straightforward, and may even override performance. Best selection practices, however, should be focused on performance. In simple terms, every target date fund incorporates the following three components:

- risky asset pool,
- protective asset pool,
- scheduled shift from risky to protective through time called a glide path.

Each TDF is unique in its structure of these three components. These differing structures set apart current

TDF offerings and establish a palate of approaches, not all of which would be described as “best practices.” Advisors should seek out the sharpshooters in all three components.

Risky Asset Pool

The best choice of risky assets is a diversified portfolio. Modern Portfolio Theory (MPT) tells us diversification provides the best returns for the least amount of risk and the ultimate diversification is the “world portfolio” comprising all assets in the world. This world portfolio includes stocks, bonds, real estate, natural resources, etc. No one really knows the composition of this ideal but it is a worthy goal.

The choice of active or passive managers is secondary to broad diversification, but if active managers are employed preference should be given to open architecture, where the advisor has complete flexibility in manager selection. Skill is hard enough to find when the search is open to all. Limiting the investment team is not likely to produce results.

Protective Asset Pool

The best protective asset preserves not only principal but also purchasing power. After all, the end game is to afford a reasonable standard of living in retirement, which means we need to be able to buy goods at future inflated prices. Variable rate bonds, Treasury Inflation-Protected bonds (TIPs), and Treasury bills are examples of good protective assets.

Long term fixed rate bonds do not work well as a protective asset because they are risky and decrease in value when inflation increases. In fact, these bonds should be included in the risky asset pool.

Glide Path

The best glide path strives for high returns in the early years, when the investor should be less risk averse, because there is plenty of time to recover if necessary and asset balances are low. Investor risk aversion should increase as account balances grow and the target date nears. The two key decisions that a target date provider must make are when to start applying the

brakes, and how forcefully.

One timing decision rule regarding when the glide path should begin is when the horizon is short enough to experience a risk of loss. “Loss” in this context should be interpreted relative to the riskless asset, which, as pointed out, could consist of TIPS or Treasury bills. It is highly unlikely that an investor in a well diversified portfolio of risky assets will underperform Treasury bills over a 20-year period. An investor who stays with the program for 20 years is highly likely to reap the reward for taking risk. Accordingly, this risk-of-loss rule argues that the brakes are first applied at 20 years to target date.

The magnitude of transfer from risky to protective asset should be determined using the principles of liability-driven investing (LDI). Sufficient assets are set aside in the protective asset such that, even if the worst case, risky return is realized over the horizon the total account balance is insulated from purchasing power loss. This structure leads to a nonlinear glide path because transfers increase exponentially.

Here’s an example. Let’s say we’re 20 years from target date and our estimate of the worst case unannualized real return (net of inflation) on risky assets is –5 percent. And let’s also say that TIPS are priced to earn a 2% real return per year, so over 20 years this would compound to more than a 45% real return. To protect against loss we want $-5(1-X) + 45X = 0$, where “X” is the amount invested in the protective asset. In this case you can verify that X is 10%, so we move 10% of assets out of risky and into protective. As the time to target date shortens, the worst case risky asset loss increases and the cumulative return on the protective asset decreases, so the amount in the protective asset increases at an increasing rate, ultimately reaching 100% at target date. See Appendix for an analysis of the risk of loss over various time periods.

So far the competition for target date business has been based on performance and has led most to favor a very gentle application of the brakes, leaving the target date fund in a substantial risky asset allocation at target date. This is dangerous. The motivation for higher risky balances at target is that the “current” fund morphs into a distribution fund. We argue that this is not in the best

interests of the investor. New distribution “products” are being introduced to accommodate a diverse set of objectives and circumstances in retirement. These distribution choices are much more complex than the accumulation decisions, so target date funds should stick to just the single objective of accumulation, which is in keeping with the appeal of simplicity.

Some providers have also engineered glide paths that are designed to react to current market conditions, also known as market timing. An analogy might help here. Ron’s first job was designing infrared countermeasures for Northrop. The equipment being developed protected U.S. aircraft by jamming heat-seeking missiles. The protocols Ron worked on were passive because they were always on, continuously sending out false heat signatures to potential attackers. An alternative approach is reactive, initiating countermeasures when a missile launch is detected. Both approaches have pluses and minuses. The passive approach offers greater protection but at a cost in aircraft performance. The active approach is riskier, with an obviously high cost in the event of failure, but many pilots preferred to take this risk to gain aircraft efficiency. The timing approach to target date glide paths is like the reactive approach to missile jamming; long run performance expectations ought to be higher to compensate for the risk of catastrophe.

CREATING INDEXES

We now introduce a series of target date indexes that follow the best practices described above. These benchmarks have been developed by Target Date Analytics, LLC to address the need for good yardsticks. They have proven difficult to beat because current practices are not yet best practices. These indexes, known as the *Pure Target Index Series*, are not just hypothetical; they are totally investable. Everyone can actually hold the indexes used in the next section which shows how real mutual funds stack up against best practices.

We start with an index series we call “Defensive.” It follows the advice described above to the letter. But we recognize that the industry needs not only normative but also practical indexes, so we designed additional indexes that are more in keeping with current practices, and add three more levels of indexes tied to the aggres-

siveness of the risky asset portfolio and the slope of the glide path. These additional indexes were designed to fit more closely with the various approaches currently in use for target date funds, and thus provide additional and tighter benchmarking functionality.

Our most assertive index is called “Aggressive” and is distinguished by a risky asset portfolio that is predominantly stocks and an allocation to risky assets at target date of 75%, which contrasts to zero risky assets at target date for our Defensive index. We fill in between these two extremes with Conservative and Moderate indexes. Indexes are currently maintained for “Current” portfolios plus 2010, 2020, 2030, 2040, and 2050. In all there are 24 indexes: four index series for each of six target dates. These indexes have been used to evaluate target date mutual funds as described in the next section.

EVALUATION OF TARGET DATE MUTUAL FUNDS

The annual returns of our four “Current” and 2020 Pure Target Indexes are shown in Tables 1 and 2. Also

reported is the annualized return from January 1, 1998 through October 31, 2007 as well as the standard deviation of return and growth of \$10,000.

As shown in Table 1, the performance of all existing target date funds failed (on average) to meet the performance standard of three of the four “Current” Pure Target Indexes (Conservative, Moderate, Aggressive). The target date funds “peer group” in what follows are all target date mutual funds with a 3-year track record as of October 31, 2007. The “Current” Defensive Index slightly lagged the peer group average performance but provided far superior performance during the troubling three-year period from 2000 - 2002. The term “Current” indicates the final asset allocation of the index or fund *at* the target date, which in the case of the Defensive “Current” index is 100% Reserve Assets (the far right side of Figure 1).

The dashed line in Figure 1 represents the asset allocation of the Defensive Pure Target Index when the asset allocation is 12 years away from the target date - or representing a 2020 target date in the year 2008 (which would be appropriate for a 55-year-old investor).

Table 1: “Current” Pure Target Indexes and Peer Group Average Performance

Calendar Year Data as of 10/31/07	“Current” Pure Target Indexes (100% Allocation in Reserve Assets)				Average Performance of all “Current” Target Date Funds (Peer Group Avg.)
	Defensive	Conservative	Moderate	Aggressive	
1998	4.50	6.71	8.76	10.56	11.76
1999	3.42	7.23	11.10	15.40	7.14
2000	10.35	6.74	3.15	(0.51)	4.85
2001	6.32	2.58	(1.20)	(5.18)	2.24
2002	10.54	4.75	(0.95)	(6.92)	(1.81)
2003	5.28	11.65	18.30	25.63	11.87
2004	5.48	8.55	11.66	15.03	6.94
2005	2.98	4.90	6.82	8.94	3.93
2006	2.31	6.58	10.98	15.77	9.04
2007 YTD	6.39	8.45	10.52	12.71	7.27
Annualized Return	5.82	6.91	7.89	8.85	6.36
Standard Deviation	2.82	2.48	6.10	10.33	4.22
Growth of \$10,000	\$17,448	\$19,288	\$21,109	\$23,013	\$18,332

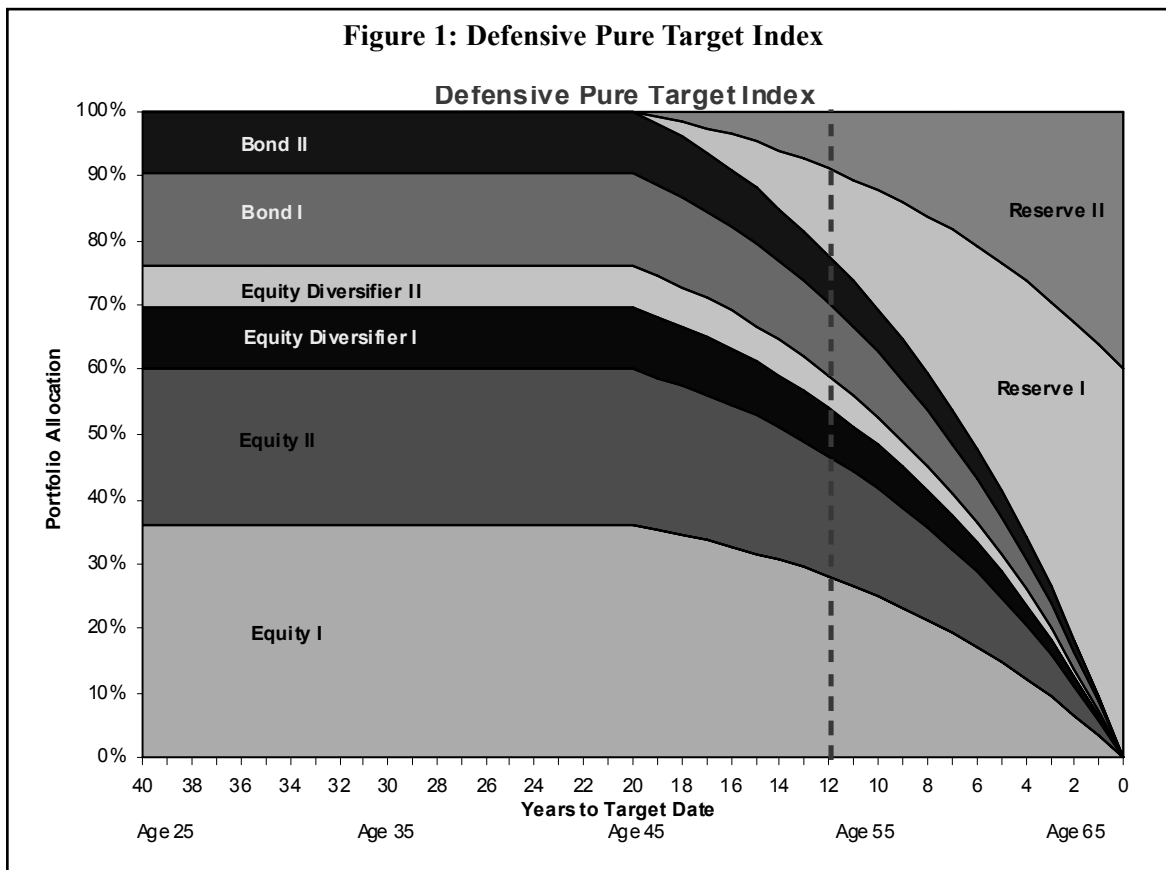


Table 2: 2020 Pure Target Indexes and Peer Group Average Performance

Calendar Year Data as of 10/31/2007	2020 Pure Target Indexes				Average Performance of all 2020 Target Date Funds (Peer Group Avg.)
	Defensive	Conservative	Moderate	Aggressive	
1998	12.66	12.57	12.48	12.28	20.44
1999	15.42	16.30	17.19	18.98	16.66
2000	(2.77)	(3.06)	(3.35)	(3.92)	(3.63)
2001	(6.72)	(7.24)	(7.76)	(8.74)	(6.60)
2002	(7.62)	(8.72)	(9.81)	(11.80)	(11.71)
2003	27.09	28.42	29.75	32.04	22.12
2004	15.15	15.86	16.58	17.78	10.26
2005	7.86	8.54	9.22	10.40	6.28
2006	15.30	16.50	17.71	19.56	13.06
2007 YTD	12.09	12.73	13.36	14.31	10.96
Annualized Return	8.46	8.74	9.01	9.42	7.33
Standard Deviation	11.21	11.94	12.68	13.99	11.58
Growth of \$10,000	\$22,228	\$22,794	\$23,365	\$24,245	\$20,044

Twelve years prior to the target date our Defensive Index has approximately an 80% allocation to Risky Assets (Equity I through Bond II) and a 20% allocation to Reserve Assets. Our three additional Pure Target indexes (Conservative, Moderate, Aggressive) would have successively higher allocations to Risky Assets at every point in time over the 40-year period.

The results for the four 2020 Pure Target Indexes are shown in Table 2. We note that the peer group average performance was well below the performance of the Pure Target Indexes with comparable levels of volatility (as measured by standard deviation of return).

BENCHMARKING

Having four distinct target date index categories (Defensive, Conservative, Moderate, Aggressive) that share the same pedigree in terms of theoretical design and core portfolio holdings - but with different starting allocations and glide paths in the 20 years prior to the

target date - permits more meaningful benchmarking and categorizing of individual target date funds. As shown in Table 3, all existing target date funds with a 3-year history as of October 31, 2007 (far right column) have been benchmarked against the Pure Target Indexes (center columns).

Of the ten 2020 funds below, three had the Defensive Pure Target Index as their best-fit index, two best-fit the Conservative Pure Target Index, four best-fit the Moderate Pure Target Index, and one fund (T. Rowe Price Retirement 2020) had as its best-fit index the Aggressive Pure Target Index. Best-fit is determined by comparing the 36-month correlation coefficient of each fund against all four indexes.

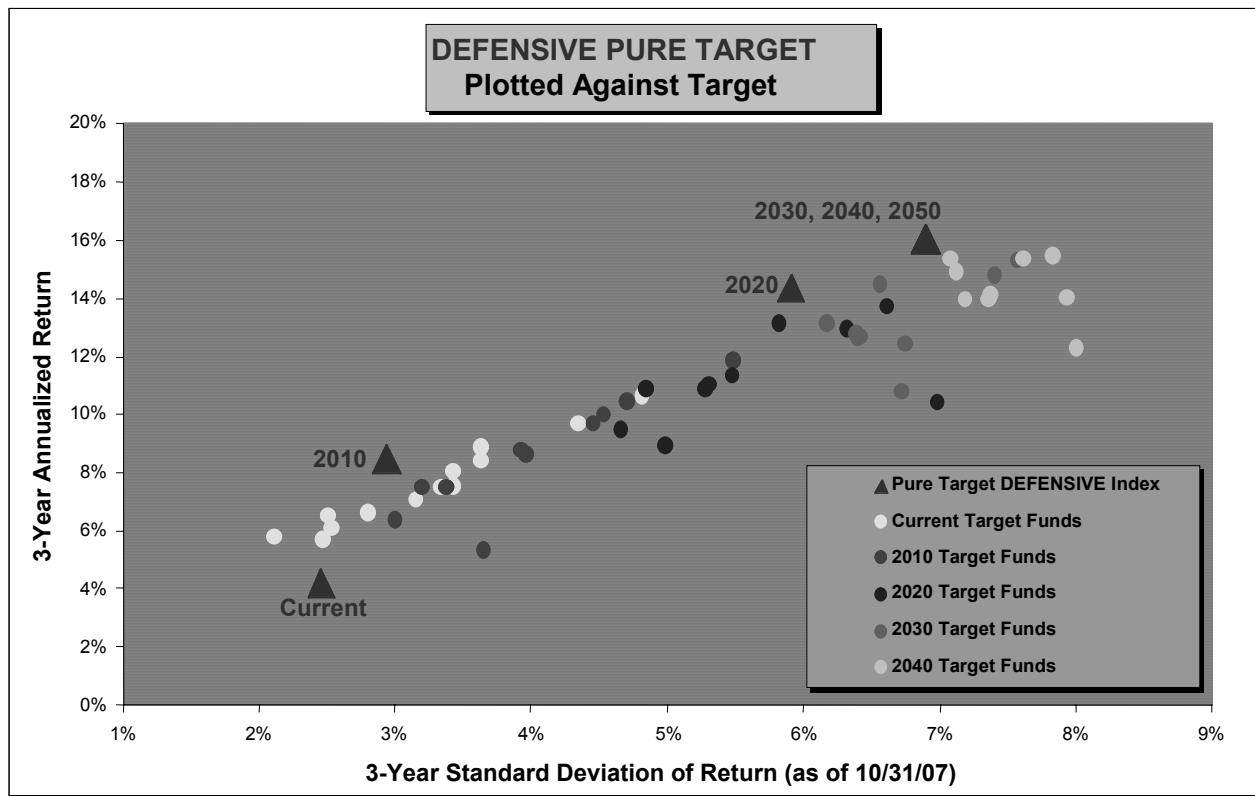
The best-fit alpha coefficients are uniformly negative, indicating that all existing target date funds are underperforming the Pure Target Indexes. This is a function of the asset selection model and the glide path used in the Pure Target Indexes.

Table 3: 2020 Pure Target Indexes and 2020 Target Date Funds (data as of 10/31/07)

2020 Pure Target Indexes and All Target Date Funds with a 3-Year History (ranked by Best-Fit Alpha)	Ticker	Best-Fit Pure Target Index	Best- Fit Alpha	Best- Fit Beta	Best-Fit R-Squared	3-Year Total Return	3-Year Beta- Adjusted Best-Fit Index Return
Pure Target 2020 Defensive Index	--	--	--	--	--	14.4%	--
Pure Target 2020 Conservative Index	--	--	--	--	--	15.4%	--
Pure Target 2020 Moderate Index	--	--	--	--	--	16.4%	--
Pure Target 2020 Aggressive Index	--	--	--	--	--	18.0%	--
Principal Inv 2020 Inst	PLWIX	Moderate	-0.67	0.81	0.93	13.2%	14.0%
WF Adv DJ Tgt 2020 I	WFOBX	Defensive	-1.10	0.79	0.93	10.9%	12.2%
T. Rowe Price Rtmt 2020	TRRBX	Aggressive	-1.25	0.80	0.90	13.7%	15.2%
TIAA-CREF Inst Life 2020	TCLTX	Defensive	-1.39	0.86	0.87	11.4%	13.0%
Fidelity Freedom 2020	FFFDX	Moderate	-1.45	0.86	0.91	13.0%	14.7%
Barclays Gbl Inv LP2020 I	STLCX	Moderate	-1.74	0.73	0.93	11.1%	13.1%
MassMutual SelDesRet2020S	MRTSX	Conservative	-1.78	0.66	0.84	9.5%	11.6%
State Farm LP2020 Inst	SAWIX	Moderate	-1.87	0.73	0.93	10.9%	13.0%
SunAm 2020 High Wtrmrk I	--	Defensive	-2.21	0.87	0.55	10.5%	13.1%
NestEgg DJ 2020 I	NETWX	Conservative	-2.86	0.72	0.86	9.0%	12.2%

Complete analysis for all target date funds with a 3-year history is available at www.TDBench.com.

Figure 2: Defensive Pure Target Index



The best-fit betas tell a similar story. For example, the Principal 2020 Fund has a -0.67 alpha and a beta of 0.81 against the Moderate 2020 Pure Target Index. The alpha indicates that if the Moderate Pure Target Index had a return of 0% , the Principal 2020 Fund would have an expected return of -0.67 percent. The beta of 0.81 indicates that the monthly returns of the Principal 2020 Fund had about 81% of the volatility of the monthly returns of the Moderate 2020 Pure Target Index.

As of October 31, 2007 the Moderate 2020 Pure Target Index had a 3-year annualized return of 16.4% compared to the 13.2% return of the Principal 2020 Fund. To make these returns more comparable, the final column in Table 3 reports the beta-adjusted return of the Moderate 2020 Pure Target Index of 14.0 percent. In other words, a $\$100$ investment in the Principal 2020 Fund had a lower terminal value after three years than an $\$81$ (beta = $.81$) investment in the Moderate 2020 Pure Target Index plus a $\$19$ investment in cash. With only 81% (as per the beta of 0.81) of a $\$100$ investment in the Pure Target Index, it still outperformed the

Principal 2020 Fund. The beta of less than 1.00 for the Principal 2020 Fund was not offset by a positive alpha, and as a result it underperforms the Pure Target Index. All 2020 funds followed this same pattern of underperformance relative to their best-fit Pure Target Index—hence our claim that current practices in target date funds do not represent best practices. The analysis shown in Table 3 has been conducted for all existing target date funds and is available at www.TDBenchmark.com.

Finally, we demonstrate the risk/return characteristics of the Defensive Pure Target Index in Figure 2. (The risk/return graphs of the other three Pure Target Indexes are available on our website.) The results are based on data as of October 31, 2007. The triangles represent the risk/return performance of all six target date series (Current, 2010, 2020, 2030, 2040, 2050). The 2030, 2040 and 2050 indexes have identical performance because (as of late 2007) they have not begun the glide path yet. The 2010—2050 Indexes demonstrate superior risk/return characteristics compared to all existing

target date funds. The “Current” Defensive Index represents the performance of the index at 100% Reserve Asset allocation.

SUMMARY

Existing target date funds, whether measured as peer groups or individually, have failed to measure up to the risk-adjusted performance standards established by the Pure Target Indexes. We propose that carefully constructed target date funds ought to have comparable risk and return characteristics. In addition, by virtue of having four indexes for each target date (Defensive through Aggressive) these new target date indexes provide a coherent way to benchmark the riskiness of all existing target date funds.

It’s important to remember that target-date indexes (and target funds in general) have two vitally important elements: a core asset allocation model and a glide path design. In the Pure Target Indexes, performance during the first 20 years (beginning 40 years prior to the target date) is governed entirely by the asset allocation model, whereas the performance of the indexes during the final 20 years (the 20 years prior to the target date) is a function of the asset allocation model and the glide path.

When gauged against the Pure Target Indexes, this paper demonstrates that current target date funds have room for improvement; especially regarding these two essential mandates: prudently grow money, and progressively protect it as the target date is approached.

The appeal of a good target date fund is simple sophistication. Investors in good target date funds are like Lexus car buyers – they don’t want to look under the hood. Our Defensive Pure Target Index is simple in the following two ways. First, an investor who enters at any time is highly likely to earn a positive real return if he stays in the fund to the target date. Second, at the target date (*i.e.*, “Current”) the Defensive Index is positioned in a 100% Reserve Asset allocation so as to protect the investor from material loss. Such a strategy might be viewed by some to be too protective. As noted in Table 1, the annualized return of the “Current” funds peer group was only 54 bps higher than the Defensive Current Index - but the average “Current” fund has an asset allocation of 40% equities and 60%

bonds/cash. More important, the average “Current” fund lost nearly 2% in 2002, while the Defensive Pure Target Index set the standard of asset protection with a return of 10.54 percent.

We propose that target date funds should be designed to match or exceed the risk-adjusted performance of the Pure Target Defensive Index. Its motto is simply this: grow money prudently and then protect it aggressively. Our other index series (Conservative, Moderate, Aggressive) sacrifice to varying degrees these two objectives so as to be more in line with industry practices, and are in fact exposed to the problems that critics have identified, such as path dependency and potential for loss. Time will tell which of these lifecycle alternatives garners the greater acceptance.

APPENDIX

Likelihood of Earning Less Than Inflation over Cumulative Time Periods

Let μ = single period expected return above inflation
 σ = single period standard deviation of real (inflation-adjusted) returns

Then $N\mu$ = N-period expected return
 $\sigma\sqrt{N}$ = N-period standard deviation

Probability of loss is determined as the number of standard deviations “Z” that zero is away from the mean:

$$N\mu - Z(\sigma\sqrt{N}) < 0 \quad \text{or} \quad Z > (\mu / \sigma)\sqrt{N}$$

Real (above inflation) expected return and standard deviations for one year

	μ^*	σ^*	μ / σ
Stocks	7%	20%	.35
Bonds	3	7	.43
60% Stocks / 40% Bonds	6	12	.50

* Expected real returns are calculated as annualized cumulative compounded monthly real returns for January, 1926 through December, 2007 (82 years). As a result the 60/40 real return is not exactly 60% of the stock real return plus 40% of the bond real return. Similarly, standard deviations are annualized monthly deviations, so the 60/40 standard deviation is not a weighted average of

the stock and bond standard deviations. Stocks are represented by the S&P500 and bonds by the Citigroup High Grade Corporate Bond Index.

Probability of real (below inflation) cumulative loss

N = number of years	Stocks	Bonds	60/40
1	20%	18%	16%
5	10	7	5
10	5	3	2
15	3	2	1
20	2	1	0.5
25	1	0.5	0.1