

## TARGETING TARGET DATE FUNDS<sup>i</sup>

<<CHANGE TONE>>

<<MAKE SOME COMMENTS ABOUT PERFORMANCE, AND ATTRIBUTION>>

### Introduction

*There is the joke about a crack marksman who visits a village only to find that the village is pockmarked with bulls-eyes on every wall – with the centers perfectly shot out. He walks into a local pub and asks the bar tender who the person is who is such a perfect shot. The bar tender points to a scruffy looking country bumpkin at the end of the bar. The marksman walks up to the bumpkin and promises him a substantial amount of money if he can tell him how he became such a good shot. The bumpkin takes the money and tells him the answer is simple – he shot first and then painted the bulls eye around the shot!!*

The same could be said about Target Date funds that have pervaded the US, which by some estimates has reached \$185bn in assets under management (Institutional Investor, March 2009, Page 34). These instruments were poorly designed and sold to individual investors as a panacea for the retirement problems and 2008 revealed the shortcomings of these products. For example, the 2010 target date fund fell on average 24.6% (i.e., average across all providers according to Morningstar), which means the investors hoping to retire in the next few years have lost over a quarter of their principal - hardly what one would

expect for products that are marketed as, “ **Simplicity:** Pick one fund — your decision’s done; **Confidence:** Each fund is professionally managed and diversified; **Convenience:** Each fund is automatically adjusted over time”<sup>ii</sup> The question one has to ask is what is truly meant by “your decision’s done”? what constitutes professional management? And what is the value of “automatic adjustment?”

According to Institutional Investor (2009), T. Rowe Price’s 2010 product returned -26.7% in 2008 (not sure if that is before or after fees). The manager of T. Rowe Price’s retirement products is quoted as saying, “2008 is one year out of many,” — small consolation for the 60 years olds who invested in their fund and paid a reasonably attractive fee for the privilege of doing so. Our guess is that other managers are equally culpable.

The problems in the DC industry are more acute as noted in Swensen (2005) who notes, “[S]erious problems result from forcing individuals to accept responsibility for retirement saving, beginning with lack of full participation in defined-contribution plans. According to a 2001 Federal Reserve Survey of Consumer Finances, more than one of four eligible 401(k) plan candidates chose not to participate. Of these employees that do participate, less than 10 percent made the maximum contribution. When participants change jobs, a distressingly high percentage cash out their accumulated retirement plan assets. Without setting aside the seed corn to begin the asset accumulation process, employees face a bleak retirement harvest.”<sup>iii</sup>

We agree completely and in this Chapter review the current Target Date fund offerings and highlight them in reasonably generic terms. In doing so, we highlight the many aspects of the design that are poor (or expensive) and risky, and ask whether these risks were highlighted to investors. This discussion is embellished with an analysis of the impact of the 2008 market downturn on savings and investment behavior. In short, products have to be improved and the chapter provides a simple solution to reducing costs by as much as 0.5 percent per year – this is a straight line improvement to investment returns. We then discuss fees and how fees might be lowered and even how the fee structures should be re-designed to ensure proper alignment of interest given that investors may find out 30 years from now that they got a poor product and fees cannot be recaptured if the fund provider was either lucky (if they outperform the benchmark) or lacking in skill (if they underperform). We then discuss how these funds might be appropriately benchmarked, specifically on a risk and skill-adjusted basis, and how plan sponsors should attribute performance to the various decisions being made by the providers (not always clear to the end participant) to see if they are getting their money's worth. Sadly, the easiest way to benchmark these funds is on a current performance basis, so we highlight an approach that can be applied to give some measure of expected wealth.

## **The Typical Target Date Fund**

*We on this side of the House are such fools as we look.<sup>iv</sup>*

### *The Basic Structure*

For a given “target date” typically restricted to years ending in 0 or 5, the typical fund can be characterized by a starting allocation to a high level asset allocation (stocks, bonds and cash), a glide path (or a predetermined rate of reallocation between equity and fixed income/cash), and a desired allocation at the retirement date. In principal, through these three parameters, the fund seeks to achieve an average allocation that is also pre-specified. Typically, the assumed retirement age is 65.

“Each fund’s asset mix becomes more conservative—both prior to and after retirement—as time elapses. This reflects the need for reduced investment risks as retirement approaches and the need for lower volatility of a portfolio, which may be a primary source of income after retiring. Once a fund reaches its most conservative planned allocation, approximately 30 years after its stated retirement year, its allocation to stocks will remain fixed at approximately 20% of assets. The remainder will be invested in fixed-income securities.”

“The allocations reflected in the glide path are also referred to as “neutral” allocations because they do not reflect tactical decisions made by Manager X to overweight or underweight a particular asset class based on its market outlook.”<sup>v</sup>

### *What the Investor Is and Is Not Delegating to the Fund Manager*

There are a series of risks that these target date fund products engender and these are summarized in Table 9.1 to indicate how lop-sided the balance is between who bears the risk and to whom the authority to make decisions has

been delegated. By virtue of making a single selection of a target date fund, the participant is taking many risks and this section is intended to highlight such risks to plan sponsors to help them force the providers to improve the design of these products.

Objectives: To some degree, the investor is delegating this to the fund manager as the objective of the investor is never clearly examined. Muralidhar (2001) has shown how the optimal allocation (static and dynamic) for DB funds depends on target wealth/replacement rates, initial wealth and risk tolerance (not to mention time). They also show that the process of making investment decisions in DC plans is identical to that in DB plans, except that DB plans have a longer time horizon and a greater ability to bear risk (because of pooling). By asking individuals to select funds based on a retirement date or some arbitrary measure of risk tolerance, the investor is making the fiduciary decision on objectives (which can be implied from the choice of fund as shown in Muralidhar 2001), but in effect is being poorly advised by the fund manager. Interestingly, Gardner and Fan (2008) discuss the need for providing a decent pension and provide detailed discussion in their paper, but then fall into the same trap as other providers in their desire to create a “simple, transparent and consistent” product.

Detailed Sub-Asset Allocation: Each fund seeks to achieve its objective by investing in a set of underlying mutual funds representing various asset classes and sectors. In other words, once a fund says that it will hold a 50-50 Stock-Bond mix, how that 50% is allocated to international and domestic stocks or value

versus growth stock etc. is a decision that is being delegated to the fund manager and often when these assets are allocated is also delegated to the fund manager.

Choice of Funds and Fees: Many providers only include funds that are part of their fund family whereas some others represent open architecture and can include outside manager funds. For example, choosing only funds from within a fund family assumes that no other outside fund, on an after-fees and cost, is effective otherwise the investor is being penalized. Moreover, some products use strictly passive funds, whereas others can use more expensive active funds. We will examine the value of the choice of even passive funds (as there is a choice between replicating a benchmark through futures, passive funds or ETFs – each with resulting implications for performance and cost).<sup>vi</sup> Recently, firms like Charles Schwab have begun to feel the pressure on fees, but even after their so-called reductions, the fees are in the range of 0.61% - 0.76%. Later in the chapter, we will demonstrate how ridiculous these fees are for a simple Target Date fund.<sup>vii</sup>

**Table 9.1: How Lop-sided are the Risks Borne by the Participant**

<b>Decision</b>	<b>Risk Borne By</b>	<b>Delegated to</b>
Objectives at Retirement	Participant	Provider is leading Participant to wrong objective with bad product
Asset Allocation over Time (Formal Glide Path)	Participant	Provider with no recourse if participant's true objective (decent pension) is not met
Rebalancing Around Glide Path	Participant	Provider with no recourse (e.g., refunding fee) if this action detracts value
Detailed sub-asset allocation	Participant	Provider again with no recourse to fees paid if such selection is poor
Choice of Funds and Fees	Participant	Plan Sponsor can choose among different vendors
Choice of Benchmark Passive Indices	Participant	Plan Sponsor, but not really clear if they can exercise much discretion given the goal of the service provider to provide products in bulk
Risk Management	Participant	Provider who again shirks all responsibility as only an asset allocation is agreed to
Currency Risk	Participant	Provider who often will not manage such risks because they got the participant to agree to this implicitly

Choice of Benchmark Passive Indices: Closely linked to the above decision is the passive index to which the assets are benchmarked in each asset class. This has

implications for cost effective replication and also potentially the impact/value of active management. This decision is also being delegated to the fund manager by the investor – because of lack of knowledge or appropriate advice as to the impact of this decision.

Reallocation Process: Each fund is managed to a specific retirement year (target date) that is typically included in its name and the investor is responsible for choosing this date. Over time, the allocation to asset classes and funds will change according to a predetermined “glide path” (the glide path is the reallocation of asset classes over time). While this is usually prescribed, the prospectus for the average fund gives latitude to the fund manager around the target (e.g., +/-5% around the glide path), how this range is utilized within the sub-asset classes, and also the timing of these shifts and hence investors are also delegating this to the fund manager.

The prospectus is very cute in regard to the fact that the fund manager does not deny that they are taking a tactical view on the market in designing a glide path, but only that it is devoid of a market view. We will demonstrate later that the tactical decision based on age may be a lot more insidious than one that is based on market views as it is effectively being set up as the investor’s decision hence removing the fund manager from the fiduciary responsibility thereafter (something most individuals would shirk from doing if presented this way).

Risk management: The issue of the objective of the fund and who is responsible for managing risks is not clear. The fund does not guarantee any retirement income (or target annuity as a percentage of salary – called the replacement



rate). Again the language of the typical perspective, vetted by lawyers no less, states that the process of reallocation is intended to satisfy “the need for reduced investment risks as retirement approaches and the need for lower volatility of a portfolio.”<sup>viii</sup> However, if bonds perform very poorly close to retirement and are extremely volatile, then the investor has no recourse as their glide path has been approved by them. In effect, risk management is now largely the responsibility of the investor, who is making decisions about markets often 20-30 years in advance, with little knowledge or ability to gauge these risks. However, again, the claim for getting more conservative is linked to the need for income in retirement and hence the investment in income providing assets.

Again, the language in the prospectus is interesting in advising investors on how to make investment decisions. “Consider your estimated retirement date and risk tolerance. These funds’ investment programs assume a retirement age of 65. It is expected that the investor will choose a fund whose stated date is closest to the date the investor turns 65. Choosing a fund targeting an earlier date represents a more conservative choice; targeting a fund with a later date represents a more aggressive choice.”<sup>ix</sup>

Currency Risk: Many funds invest in foreign assets and highlight the impact of currency risks. However, Muralidhar (2001) has shown that the choice of long term benchmark for currency carries with it an implicit bet on the US dollar. For example, an unhedged (fully hedged) benchmark for international assets, which is then passively replicated takes an implicit view that the US dollar will be weak (strong). Unless active currency management is employed in the international equity fund – a rare occurrence and even rarer that these managers are

professional currency managers – the investor is taking an unmanaged currency bet.

## **The Survey Says**

There is a famous game show in the United States called “Family Feud,” where two clans compete against each other to answer questions relating to a survey conducted on the general public. Before revealing the results, the host usually leads off with the line, “...and the survey says...” before revealing the answers from the survey and the clan member realizes how good or bad their guess was. In a similar vein, a recent survey provided results of a survey of the general population regarding their understanding of Target Date Funds – sadly, the survey paints an equally dismal picture of the understanding of these products by the participants and one would expect that if Table 9.1 were shown to participants, plan sponsors and Department of Labor representatives, the reaction would be more fear than willingness to participate in these products. The article is taken verbatim from Plan Sponsor magazine’s website to ensure completeness.

*“Promises They Can’t Keep: Misconceptions about Target-date Funds”<sup>x</sup>*

A recent survey from Envestnet Asset Management revealed individuals have trouble understanding target-date funds.

Only 16% of survey respondents said they had heard of target-date funds prior to the survey, and 63% of those incorrectly described them.

After reading a composite description of target-date funds, respondents said the funds offered the following promises:

- Nearly 62% of respondents thought they would be able to retire on the fund's target date;
- 62% said they could spend less time tracking their progress toward retirement goals;
- Almost half (48.6%) said they could stop worrying about investment and savings decisions and leave everything up to a professional;
- Roughly 38% of respondents believe the funds will produce a guaranteed return;
- More than one-third (35.5%) of respondents believe their money will grow faster in target-date funds than in other investments; and
- Almost 30% believe they can save less money with the funds and still meet their retirement goals.

Respondents also had little sense of the risks of investing in target-date funds:

- 41% think there is little or no risk of losing money in a one-year period, and 57% believe it is unlikely that they can lose money in any 10-year period;
- One-fifth of respondents believe it is less likely they could lose money in target-date funds than in money market funds, while 50% believe the odds were equal;
- 28% thought they were less likely to lose money in target-date funds than in equity mutual funds, while 52% thought the odds were the same; and

- 38% of respondents thought the risk levels in funds with the same target date would be very similar.

When asked to choose from a list of seven potential target-date portfolios, the majority of respondents selected the most aggressive fund, based on expected returns over a 10-year period. Only 8% of respondents said selecting a retirement savings rate was the most important retirement planning decision they could make.

Investnet surveyed 251 individuals ages 25 - 70 employed now or in the past year.

### **The Numbers Show an Even More Troubling Pattern – Something Has Got to Give**

To explain the general implications for the risks borne by Defined Contribution participants, the attached example highlights the key actions that a year like 2008 would imply to ensure a reasonable retirement. For most young participants, these plans may provide the entire retirement income (given the uncertainties of global Social Security programs<sup>xi</sup>).

The case study reviews three identical individuals at different stages of their life cycle – the first, a 25 year old employee who has just joined the work force with a \$50,000 per year salary. To keep the analysis similar, the case study also

highlights the same individual assuming that they had commenced employment in 1987 and is currently 45 years old; the third is an individual on the cusp of retirement, having joined the work force in 1968 (and currently 65 years). The assumptions for the general economic environment, demographics and asset markets are provided in Table 9.2 below. For simplicity, inflation is assumed to be a static 3% every year, real salary growth is assumed to be 1% annually; the participant is expected to live for 20 years and contributes 10% of current salary (with no caps – again for simplicity) into a pension plan.

<b>Assumptions</b>	Return in 2008	-20%
3% Inflation Growth	Assume Fees of 0.75%	
	Starting Income	50,000
Retire at 65; Live till 85	Standard Contribution	10%
	Return on Assets Prior to 2007	8%
	Salary Growth	4%

**Table 9.2: Assumptions for the case study**

The base assumption is that assets earn a guaranteed 8% for all years except 2008, when they earn -20%. Asad-Syed, Muralidhar and van der Wouden (1998) provide a simple model to help participants establish the linkages among the variables – for a target replacement, for the given parameters, there is a unique contribution and vice versa. In other words, if one sets their mind on a target replacement rate, and they have a bad year of performance, contributions must increase and/or the rate of return on future investments must increase.

Aon (2008) demonstrates that a reasonable replacement rate for an average cohort is approximately 78% of final salary. Table 9.3 provides the results of running the model described in Asad-Syed et al (1998) and shows what would happen in a perfect world. If the various parameters are fixed, then in a perfect world with no stochasticity of variables, the participant would receive approximately 72% of final salary (or 142% of average salary). Conversely, should the participant choose to receive a 100% replacement rate in every year of retirement, then at an 8% annualized return, they must contribute approximately 7% based on average salary and 13.9% based on final salary.

Scenarios	Replacement Rate	Balance at Retirement	Contribution at 8% for 100% Replacement	Contribution at 7.25% for 100% Replacement
Perfect Life - Average	141.85%	2,284,673	7.05%	8.87%
Perfect Life - Final	71.94%	2,284,673	13.90%	17.50%

**Table 9.3: A Perfect World – The Link Between Replacement Rates, Contribution Rates and Rates of Return**

The last column demonstrates one of the more insidious aspects of the current Target Date Funds – namely, the impact of fees. By all accounts, the fee of the average product is approximately 0.75% annualized. We would argue that this is usurious for the services provided and will discuss how these fees can and should be dramatically reduced, but the key point is that the application of fees reduces the net return, in turn, **raising the required contribution by 1.82% a year** (if the client seeks a 100% replacement on average salary) **and by 3.6% a year for a participant focused on final salary.** This simple table demonstrates the dramatic impact of fees – however small – on saving behavior and this advice is not being

provided to participants.<sup>xii</sup> This is particularly relevant because in 2008, many companies dropped or dramatically lowered their 401(K) match in the United States – in short, implicitly telling participants to lower their retirement expectations, especially given the damaging impact of asset performance in 2008.

To highlight the impact of a year like 2008 on retirement planning, Table 9.4 demonstrates how it impacts participants in various cohorts – from a new entrant, to a mid career employee and a person on the cusp of retirement. For simplicity, we assume that all Target Date Funds earned -20% in 2008. Many fund providers have not changed their long term expected return forecasts, so we continue to assume that the glide path ensures an 8% (or 7.25% after fees) annualized return. For the new entrant, a big shock like this requires higher contributions that are only slightly higher than the original target contribution – but if a company match has been withdrawn, then the participant needs to step up to the plate to make up the difference (and this will hurt consumption at a macro level which cannot be good for the future return on equity).

Age in 2007	Wealth at end 2007	Wealth at end 2008	Contribution at 8%	Contribution at 7.25%
25 Year Old - 100% Average	5,400	4,320	7.10%	9.03%
25 Year Old - 100% Final			14.18%	17.90%
45 Year Old - 100% Average	344,383	275,507	<b>15.01%</b>	<b>16.92%</b>
45 Year Old - 100% Final			<b>28.72%</b>	<b>31.42%</b>
64 Year Old - 100% Average	2,115,438	<b>1,692,350</b>	N/A	N/A
64 Year Old - 100% Final				

## **Table 9.4: Impact of 2008 and Fees on Different Cohorts with Different Retirement Objectives**

The problems really begin to show with the 45 year old employee as (a) the negative return was earned on a pool of assets that was reasonably substantial (i.e., **the -20% return was not applied just to the contribution for 2008, but to the entire savings until that date**). In short, given the reduced time to make up shortfalls as one ages, 2008 causes a 45 year old participant to double their contribution to have any hope of achieving the original target replacement rate. **With the 65 year old, we do not even bother to show the required contribution as it is in excess of 400% as the depletion of wealth is substantial!**

So, to the T. Rowe Price manager quoted as saying that 2008 was just one year out of many, we say – tell it to the 65 year old or even the 45 year-old who now has to save double. However, we would argue that to this same manager, a smart plan sponsor would say, maybe the **bulk of the fees need to be differed and paid if the target return is achieved.**

### **Some Simple Fixes and Suggestions for Improvements to these Products**

*Honest businessmen should be protected from the unscrupulous consumer.*

*xiii*

The current approach of the industry to the problems of 2008 border on the ridiculous. Rather than fixing what is broken, the entire focus is on (a) whether to include outside managers or not or adding passive managers to lower fees; (b)



adding illiquid, high fee asset classes such as private equity and hedge funds; (c) finding a way to incorporate the managers in the DB plan to lower manager costs; (d) meddling with the glide path; and (d) adding new products (TIPs, Emerging markets) to “increase diversification.” There is apparently some attempt to start to guarantee annuities as the focus shifts from asset allocation to retirement income, but this is far from the norm.<sup>xiv</sup> Sadly, none of these measures achieves any lasting good so we propose a few ideas below.

### *Providers Must State a Target Return (or Replacement Rate)*

At a minimum, plan sponsors should require Target Date Fund providers to state a long term return on their various products. While there is no guarantee that these will be achieved, at least the participant will know where they stand and can engage in thoughtful retirement planning using a version of the analysis provided to support Table 9.2. This way, Target Date Fund products can be ranked more clearly based on their target return using either absolute or risk-adjusted rankings. However, there is a concern among plan sponsors that participants who are not sophisticated may not be capable of making the distinction between higher returns and higher risk.<sup>xv</sup>

### *Providers Must Be Explicit about What Risks Participants Bear and Guide them on Such Risk Taking*

If providers continue to provide useless products, the least they can do is improve their disclosures of risks being borne by participants and way to mitigate the risk.

For example, all these Target Date Fund providers are massive investment complexes – with plenty of high paid staff who can pontificate on how the funds are likely to perform in the coming year given their outlook on stocks vs bonds. This way, a smart participant, can at least switch the fund they are in to reflect the best thinking of fund complex. In effect, **getting out of a fund that is likely to underperform is risk management**. Step out of a few land mines and there is a high probability that retirement objectives can be achieved without substantial additional sacrifices.

#### *Create Exposure to Assets through Futures and Dramatically Lower Costs*

If the key to achieving long term retirement objectives, at least with the blind rubber stamp of the Department of Labor's QDIA, is to focus on asset allocation, then maybe the various fund providers should give participants a break and use futures to create a broadly diversified portfolio of assets that are liquid, transparent, readily traded at low cost, have limited credit risk etc. Today, for the average US client, the following exposures can be readily created: US Large Cap, US Small Cap, MSCI EAFE, MSCI Emerging (low liquidity today, but even if \$50 billion moved to this market, liquidity would improve dramatically), US Government Bonds, Foreign Government Bonds, Currency and even Commodities. One would expect, that utilizing futures to create asset class exposure can **save participants as much as 0.5% annually**.

#### *Apply SMART Rebalancing to the Various Funds*

Since the fund managers are taking a host of bets anyhow, it seems like the most valuable bet would be to implement a SMART Rebalancing program. In this fashion, the link to an artificially chosen and DoL rubber-stamped dynamic asset allocation, can be easily mitigated. So if it turns out that older cohorts are largely being pushed into fixed income, but given current yields and the likelihood of further debt being issued by the government to bail out an economy in trouble or inflation rising, there is general consensus that fixed income will perform worse than say cash or equities, then fund managers (and even the DoL) should implement some version of SMART Rebalancing to protect the naïve participant.

### *Cut Fees and Defer them till Sufficient Time has Passed*

Once fund managers use futures contracts to create asset class exposure and drop the basic fee, then plan sponsors should go the additional step of righting another wrong – **namely, not aying managers up front for performance that is not guaranteed for many years into the future.** The fund manager should get a basic fee of a few basis points to set up the structure of the funds, but the balance of the fee should only be paid out when the fund manager can credibly show that they have outperformed the static, naïve benchmark on a risk and skill adjusted basis.<sup>xvi</sup> Setting up the right incentive scheme is critical to ensuring that fund managers do not go on a massive asset gathering run, but rather focus on delivering the objectives that the participants need. This will be covered in more detail in future research as there are a number of operational issues that will need to be clarified.<sup>xvii</sup>

## CONCLUSIONS

Target funds have ballooned to approximately \$185 billion yet 2008 have proved quite disastrous as performance tumbled dramatically. On examining these funds, one can easily come to the conclusion that they have been poorly designed, but more insidiously, poorly marketed and poorly explained. The marketing material is designed to prevent lawsuits, but does not let the average participant in a 401(K) plan realize what investments decisions they are making, as opposed to delegating to the fund providers, and that too for high fees. We debunk the appeal of these products by highlighting the poor design, suggest benchmarks for these funds that allow for risk-adjusted performance (across all target dates and fund families), and discuss more appropriate fee structures given the length of mandate and the high likelihood that these products will not deliver what investors had expected. This article will probably lead to a totally new regulation of these funds and hopefully have them removed from a list of Qualified Default Investment options allowed by the Labor Department unless the US wants to bail out yet another industry for poorly designed regulation.

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<sup>i</sup> This chapter would have never been written if it had not been for the incredible amount of time taken and education provided by Karin Brodbeck, Roger Paschke, Charlie Ruffel and Matt Smith.

<sup>ii</sup> Manager X – Retirement Date Funds Summary March 2009. We will keep this manager's name confidential as this article is not about the practice of a single manager but rather of the industry as a whole – this manager being just one of the larger players.

<sup>iii</sup> Page 22.

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<sup>iv</sup> Petras (2001) quoting a House member overheard retorting to taunts.

<sup>v</sup> Manager X Retirement Funds, Prospectus, [October 1, 2008](#)

<sup>vi</sup> Average DC fund fees = 0.72% -

[http://www.plansponsor.com/pi\\_type11/?RECORD\\_ID=45978&page=2](http://www.plansponsor.com/pi_type11/?RECORD_ID=45978&page=2)

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<http://www.pionline.com/apps/pbcs.dll/article?AID=/20090421/REG/904219997&nocache=1>

<sup>viii</sup> Ibid. The prospectus is chock full of language on investment risks – currency risk, duration risk etc, but are silent about not achieving the investor’s goal.

<sup>ix</sup> Ibid.

<sup>x</sup> [www.PLANSPONSOR.com](http://www.PLANSPONSOR.com). May 5, 2009

<sup>xi</sup> See Modigliani and Muralidhar (2004).

<sup>xii</sup> I thank Roger Paschke of the Hearst Corporation for motivating this discussion. In his quest to design the best system for his participants he continues to focus on advising staff on how to save and the next table is in response to my discussions with him.

<sup>xiii</sup> Petras (2001), page 31, quoting Lester Maddox, then governor of Georgia, on why Georgia should not create a consumer protection agency.

<sup>xiv</sup>

<http://www.pionline.com/apps/pbcs.dll/article?AID=/20090421/REG/904219997&nocache=1>.

<sup>xv</sup> I thank Roger Paschke for this clarification.

<sup>xvi</sup> We will pursue this in separate research, but in a nut-shell, this would require calibrating all target date funds to a fund that is run (a) with a static allocation which at the current average expected return of all vendors achieves say an 8% expected return; and (b) assumes that all assets are created using futures – so the benchmark indices are also chosen. The glide path is a tactical bet as is the choice of managers other than the most liquid option. Now every fund can be measured against this live fund on an after-fee basis and risk adjustment could be done using either the M-square or the M-cube (will require a target risk budget). The manager will also only be paid the balance of the fee once the confidence in skill exceeds some threshold such as 75%. All of this has been covered in the book in Chapters 2, 3 and 7).

<sup>xvii</sup> I thank Karin Brodbeck for this comment.