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June 4, 2009

Office of Regulations and Interpretations
Employee Benefits Security Administration
Attn: Target Date Fund Joint Hearing, Room N-5655
U.S. Department of Labor
200 Constitution Avenue, NW
Washington, DC 20210

Joseph S. Piacentini
Chief Economist and Director of Policy and Research
Employee Benefits Security Administration, USDOL

Re: File No. 4-5 82 Target Date Fund Joint Hearing

Dear Sir:

Please accept our respectful request to appear and provide testimony at your June 18, 2009 joint hearing regarding Target Date Funds ("TDFs"). If selected, I would be prepared to discuss the findings from work critically analysing the performance of age-based (or deterministic) target date funds (published in the current *Journal of Portfolio Management*) and competing dynamic TDF product design:

- **The Perils of Deterministic (or age-based) TDFs**: Deterministic TDFs are set up with the dual objective of promoting growth in the value of retirement plan assets when members are young and then preserving the value of accumulated wealth as they grow older. Our evidence suggests that such products are likely to fail on both counts. (4 minutes)
- **Opportunity cost of TDFs**: One of the only redeeming features of deterministic TDFs is they result in slightly superior terminal wealth in the worst 10 per cent of investment scenarios. However, the differences are so marginal it is hard to imagine any rational investor picking a lifecycle fund based on this benefit because it comes at the high cost of giving up significant upside potential. (4 minutes)
- **The Next Generation, Dynamic TDFs**. Dynamic TDFs involves switching in and out of equities and bonds according to which asset class is ahead or falling short of targets within individual portfolios, hence the switching decision is informed by a target, rather than a predetermined switching on age. (2 minutes)

If you have any questions regarding our request, or would like additional details about the submission, please contact me at +61-7-373-55311 or via e-mail at michael.drew@griffith.edu.au.

Sincerely,

Mike Drew

Michael E. Drew, Ph.D.

Biographical Details

Michael E. Drew

Ph.D. (Qld), SF Fin

Areas of Expertise

Superannuation, Pensions and Investment Management

Michael joined the Griffith Business School, Griffith University as Professor of Finance in 2008. Prior to this post, Michael was head of the Investment Services division at QSuper, one of Australia's largest superannuation funds, with 470,000 members and in excess of $23 billion in funds under management. In 2009, Michael was invited to join the QSuper Investment Committee. The Investment Committee is a sub-committee of the QSuper Board and its purpose is to provide expert investment guidance to the Board so as to enable the trustees to discharge investment oversight in relation to the Fund's assets.

Michael has held various academic posts at the Australian National University and the Queensland University of Technology and has published extensively on the topics of superannuation and investment management in academic and practitioner journals, including the *Journal of Portfolio Management*. His research agenda has been supported by the Australian Research Council's Discovery and Linkage funding schemes (with over A$3.8 million in funding from ARC Schemes) and numerous industry grants. Michael has also actively consulted and providing training to the private and public sectors on a range of asset consulting, financial advisory and industry performance related matters. Prior to joining academe in 1999, Michael held stockbroking appointments with Wilson HTM, JB Were & Son and Ord Minnett.

Michael's work has been cited by various industry, academic and government agencies including the : International Monetary Fund, World Bank, Australian Prudential Regulation Authority; Reserve Bank of Australia; Senate Select Committee on Superannuation (Planning for Retirement); Australian Institute of Superannuation Trustees; Investment and Financial Services Association; Australian Bankers' Association; Australian Industrial Relations Commission; Clayton Utz; Law Society of New South Wales; National Seniors; New Zealand Treasury; the Pensions Institute; and, PriceWaterhouseCoopers. In addition, various papers are on the recommended reading lists for the Institute of Actuaries, Hedge Fund Consistency Index, BehaviouralFinance.net, and the American Marketing Association. Michael's research findings have been reported in the Financial Times (London), the Australian Financial Review, The Australian, The Age, The Courier Mail, ABC Radio, and the Sunday-Star Times (Auckland).

Michael's research has won a number of awards, including the Emerald Literati Network Highly Commended Award and the JASSA Merit award. Michael is a past recipient of The Executive Dean's Award for Excellence in Research, Faculty of Business, Queensland University of Technology and the Dean's Commendation List for Outstanding PhD Theses, Dean of Postgraduate Students, University of Queensland.

Michael is a Senior Fellow of the Financial Services Institute of Australasia (FINSIA) and holds the degrees of Bachelor of Economics; Master of Economic Studies; and, Doctor of Philosophy (in the field of economics) from the University of Queensland; and a Graduate Certificate in Higher Education from Griffith University.

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Portfolio Size Effect in Retirement Accounts: *What Does It Imply for Lifecycle Asset Allocation Funds*

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Lifecycle funds have gained great popularity in recent years. Sponsors of defined contribution (DC) plans offer more and more of these funds as investment options to plan participants. In many cases, these funds serve as default investment vehicles for plan participants who do not make any decisions about the investment of their plan contributions. As reported by Vanguard [2006], one of the largest pension plan managers in the US, two-thirds of their plans offered a lifecycle option in 2005, up from one-third in 2000. Assets in lifecycle funds amounted to $160 billion in 2005 compared to less than $10 billion in 1996 (Gordon and Stockton [2006]). The rapid growth of lifecycle investment programs within DC plans is often attributed to the fact that they simplify asset allocation choices for millions of ordinary investors who supposedly lack the knowledge or inclination to adjust their retirement portfolios over time.[1] For such an investor, the lifecycle fund offers an automatic "set it and forget it" solution by periodically modifying the asset allocation of retirement investments in line with the investor's diminishing capacity to bear risk.

The central theme of the lifecycle model of investing is that an investor's portfolio should become increasingly conservative as the investor ages (see, for example, Malkiel [2003]). In retirement plans, this is done by switching investments from more-volatile assets (e.g., stocks) to less-volatile assets (e.g., fixed-interest securities, such as bonds and cash equivalents) as the participant approaches retirement. For example, the Vanguard Target Retirement Funds' prospectus states that

> [i]t is also important to realize that the asset allocation strategy you use today may not be appropriate as you move closer to retirement. The Target Retirement Funds are designed to provide you with a single Fund whose asset allocation changes over time as your investment horizon changes. Each Fund's asset allocation becomes more conservative as you approach retirement.

Although the lifecycle funds offered by different providers vary from one another with respect to how and when they switch assets, there is total unanimity about the overall direction of the switch—from stocks to bonds and cash.

The practitioner's common belief that an investor's exposure to risky assets should decrease with age (and the consequent shortening of the investment horizon) has been theoretically refuted by Samuelson [1963] and more recently by Bodie [1995], among others. There is no dearth, however, of published theoretical work that lends support to the popular view of practitioners (see, for example, Merrill and Thorley [1996] and Levy and Cohen [1998]). The relationship between horizons and investment risk has also been examined by empirical researchers resulting in different conclusions.[2] Much of the empirical work considers the case of a multi-period investor who invests in a portfolio of assets at the beginning of the first period and reinvests the original sum and the accumulated returns over several periods in the investment horizon.[3] The situation of retirement plan participants, however, is more complex, because they make additional, periodic investments in the form of plan contributions until their retirement. As a result, the plan participant's terminal wealth is determined not only by the strategic asset allocation governing investment returns, but also by the periodic contribution amounts that alter the size of the portfolio at different points on the horizon.

A recent observation by Shiller [2005a] harped on this issue, questioning the intuitive foundation of conventional lifecycle switching for investors' retirement plans. Shiller argued that

> a lifecycle plan that makes the percent allocated to stocks something akin to the privately offered lifecycle plans may do much worse than a 100% stocks portfolio since young people have relatively little income when compared to older workers…. The lifecycle portfolio would be heavily in the stock market (in the early years) only for a relatively small amount of money, and would pull most of the portfolio out of the stock market in the very years when earnings are highest.

The statement is remarkable in asserting that the portfolio size of a plan participant at different points in time is significant from an asset allocation perspective. If Shiller's assertion is true, then lifecycle funds may be missing a trick by ignoring the growing size of the participant's portfolio over time, while switching assets from stocks to fixed income or cash.

The size of the participant's retirement portfolio is likely to grow with time, not only because of possible growth in salary and the size of contributions, as Shiller indicates, but also due to the tax-free accumulation of plan contributions and the investment returns. In such a case, it would make little sense for the investor to follow the prescriptions of conventional lifecycle asset allocation. By moving away from stocks to low-return asset classes as the size of the retirement fund grows larger, the investor would be effectively foregoing the opportunity to earn higher returns on a larger sum of money invested.

But there is another side to this story. Advocates of lifecycle strategies point out that a severe downturn in the stock market at later stages of working life can have dangerous consequences for the financial health of a participant holding a stock-heavy retirement portfolio, not only because the market downturn can significantly erode the value of the investor's nest egg, but also because it leaves the participant with very little time to recover from the bad investment results. Lifecycle funds, by contrast, are specifically designed to preserve the nest egg of the graying investor. By gradually switching investments from stocks to less-volatile assets over time, lifecycle funds aim to lessen the chance of an investor confronting a very adverse investment outcome as he nears retirement.

In this article, we examine whether the lifecycle investment strategy benefits, or works against, the retirement plan participant's wealth accumulation goal, by reducing the allocation to stocks as the participant approaches retirement. We are particularly interested in testing whether the growing size of the accumulation portfolio in later years indeed calls for a higher allocation to stocks to produce better outcomes, despite the lurking danger of a sharp decline in stock prices close to retirement. Because an important objective of the lifecycle strategy is to avoid the most disastrous outcomes coincident with retirement, we assess its efficacy as the investment vehicle of choice for plan participants by examining various possible retirement wealth outcomes, in particular, the most adverse ones that could be generated by following such a strategy.

DATA AND METHODOLOGY

We examined the case of a hypothetical retirement plan participant with a starting salary of \$25,000 and a contribution rate of 9%. The growth in salary is assumed to be 4% a year. The participant's employment life is assumed to be 41 years, during which regular contributions are made into the retirement plan account. For the sake of simplicity, we assumed that the contributions are credited annually to the accumulation fund at the end of every year, and the portfolio is also rebalanced at the same time to maintain the target asset allocation. Therefore, the first investment is made at the end of the first year of employment followed by 39 more annual contributions to the account.

A number of studies in recent years, including Hickman et al. [2001] and Shiller [2005b], compared terminal wealth outcomes of 100% stock portfolios with those of lifecycle portfolios and found little reason for investors to choose lifecycle strategies for investing retirement plan contributions. But these studies were not specifically designed to test whether the allocation toward stocks should be favored during the later stages of the investment horizon because of the growth in size of the investor's portfolio. The studies' competing strategies invest in different asset classes for differing lengths of time, and are therefore bound to result in different outcomes simply because of the return differentials between the asset classes. For example, it could be argued that a 100% stock portfolio may dominate a lifecycle portfolio purely because the former holds stocks over a longer duration. The role played by the growing size of the portfolio over time and its interplay with the asset allocation in influencing the final wealth outcome is not very clear from this result.

To discover whether, as the investor ages, the growth in the size of contributions and of the overall portfolio renders the conventional lifecycle asset allocation model counterproductive—as Shiller conjectures—we push the envelope a bit further. We considered hypothetical strategies that invest in less-volatile assets, such as bonds and cash, when a participant is younger, and then switch to invest in stocks as the participant grows older (i.e., strategies that reverse the direction of asset switching of conventional lifecycle models). These strategies, which we call *contrarian* strategies in this article, are well placed to exploit the high returns offered by the stock market as the participant's accumulation fund grows larger during the latter part of her career. Moreover, we designed the contrarian strategies to hold the invested asset classes for a length of time that is identical to the corresponding lifecycle strategies. This provision is necessary to ensure that we are not comparing apples to oranges as would be the case if we were to compare the outcomes of any lifecycle strategy with a fixed-weight strategy, such as holding 100% stocks throughout the investment horizon, or even with another lifecycle strategy that holds stocks (and other asset classes) for unequal lengths of time.[4]

Initially, we constructed four lifecycle strategies, all of which initially invest in a 100% stock portfolio, but start switching—after 20, 25, 30, and 35 years of the commencement of investing, respectively—from stocks to less-volatile assets (bonds and cash) at different points in time. We made a simplifying assumption that the switching of assets takes place annually in a linear fashion and in such a manner that in the final year before retirement all four lifecycle strategies are invested in bonds and cash only. The proportion of assets switched from stocks every year is equally allocated between bonds and cash.[5]

Next, we paired each lifecycle strategy with a contrarian strategy that is actually its mirror image in terms of asset allocation. In other words, the contrarian strategies replicate the asset allocation of lifecycle portfolios in the reverse order. All four contrarian strategies invest in a portfolio composed of only bonds and cash in the beginning and then switch linearly every year to stocks in proportions that mirror the asset switching for corresponding lifecycle strategies. The four pairs of lifecycle and contrarian strategies are the following:

Pair A. The lifecycle strategy (20, 20) invests only in stocks for the first 20 years and then linearly switches from stocks to bonds and cash over the remaining period. At the end of 40 years, all assets held are bonds and cash. The corresponding contrarian strategy (20, 20) invests only in bonds and cash in the initial year of investment. It linearly switches bonds and cash to stocks over the first 20 years, at the end of which the resultant portfolio is composed only of stocks. The 100% stock allocation remains unchanged for the next 20 years.

Pair B. The lifecycle strategy (25, 15) invests only in stocks for the first 25 years and then linearly switches stocks to bonds and cash over the remaining period. At the end of 40 years, all assets held are bonds and cash. The corresponding contrarian strategy (15, 25) invests only in bonds and cash in the initial year of investment. It then linearly switches bonds and cash to stocks over the first 15 years, at the end of which the resultant portfolio is composed only of stocks. The 100% stock allocation remains unchanged for the remaining 25 years.

Pair C. The lifecycle strategy (30, 10) invests only in stocks for the first 30 years and then linearly switches stocks to bonds and cash over the remaining period. At the end of 40 years, all assets held are bonds and cash. The corresponding contrarian strategy (10, 30) invests only in bonds and cash in the initial year of investment. It linearly switches bonds and cash to stocks over the first 10 years, at the end of which the resultant portfolio is composed only of stocks. The 100% stock allocation remains unchanged for the remaining 30 years.

Pair D. The lifecycle strategy (35, 5) invests only in stocks for the first 35 years and then linearly switches stocks to bonds and cash over the remaining period. At the end of 40 years, all assets held are bonds and cash. The corresponding contrarian strategy (5, 35) invests only in bonds and cash in the initial year of investment. It linearly switches bonds and cash to stocks over the first 5 years, at the end of which the resultant portfolio is composed only of stocks. The 100% stock allocation remains unchanged for the remaining 35 years.

The outlined test formulation allows us to directly compare wealth outcomes of a lifecycle strategy to those of a contrarian strategy that invests in stocks (and conservative assets) for the same duration, but at different points on the investment horizon. The allocation of any lifecycle strategy is identical to that of the paired contrarian strategy in terms of length of time invested in stocks (and conservative assets). The strategies only differ in terms of *when* they invest in stocks (and conservative assets)—that is, early or late in the investment horizon. For example, in the case of Pair A, both the lifecycle (20, 20) and contrarian (20, 20) strategies invest in a 100% stock portfolio for 20 years, and allocate assets in identical proportions between stocks and bonds/cash for the remaining 20 years. However, the former holds a 100% stock portfolio during the first 20 years of the horizon in contrast to the latter, which holds a 100% stock portfolio during the last 20 years of the horizon. The respective allocations are graphically demonstrated in Exhibit 1.

To generate investment returns under every strategy, we followed a random draw with replacement from the empirical distribution of asset class returns. The historical annual return data for the asset classes are randomly resampled with replacement to generate asset class return vectors for each year of the 40-year investment horizon of the DC plan participant. Thus we retained the cross-correlation between the asset class returns as given by the historical data series, while assuming that returns for individual asset classes are independently distributed over time. The asset class return vectors were then combined with the weights accorded the asset classes in the portfolio (governed by the asset allocation strategy) to generate portfolio returns for each year in the 40-year horizon. The simulated investment returns were applied to the retirement account balance at the end of every year to arrive at the terminal wealth in the account. For each lifecycle and contrarian strategy the simulation was iterated 10,000 times. Thus, each of the eight strategies has 10,000 investment return paths resulting in 10,000 wealth outcomes at the end of the 40-year horizon.

To resample returns, we used an updated version of the dataset of nominal returns for U.S. stocks, long T-bonds, and T-bills originally compiled by Dimson, Marsh, and Staunton [2002], and commercially available through Ibbotson Associates. The annual return data series covers the 105-year period from 1900 to 2004. Because the dataset spans several decades, we were able to capture the wide-ranging effects of favorable and unfavorable return events on the individual asset classes included in our test. The returns include reinvested income and capital gains.

RESULTS AND DISCUSSION

Comparing various parameters of the terminal wealth distribution for the lifecycle strategies and their contrarian counterparts provides us a fair view of their relative appeal to the retirement investor. In particular, we looked at the mean, median, and quartiles of the terminal wealth distribution of the different asset allocation strategies. Exhibit 2 provides these statistics. As even a cursory glance reveals, significant differences are noticeable in these numbers.

In each of the four pairs, the contrarian strategies result in much higher expected value (mean) than the lifecycle strategies. The difference is most striking for Pairs A and B as the mean wealth at retirement for the contrarian strategies exceeds that of the corresponding lifecycle strategies by more than $500,000. While the differences between expected values of the other two lifecycle and contrarian pairs (C and D) are less eye-popping, they are still very large.

It is important to note, however, that the mean is not the most likely outcome or even the average likely outcome for any of the strategies. This is apparent from the skewness of the terminal wealth distributions. The means of the distributions are much higher than the medians, which indicates the probability of achieving the mean outcome is much less than 50%. In other words, the participants would have to have "better than average" luck to achieve the mean outcome at retirement. The average outcome in this case is, therefore, much more accurately represented by the median of all outcomes.

But even an evaluation of the median estimates does not change the story. In all pairs, the contrarian portfolios beat the lifecycle portfolios hands down. For example, the contrarian (20, 20) strategy in Pair A results in a median

EXHIBIT 1
Asset Allocation at Different Points of Investment Horizon

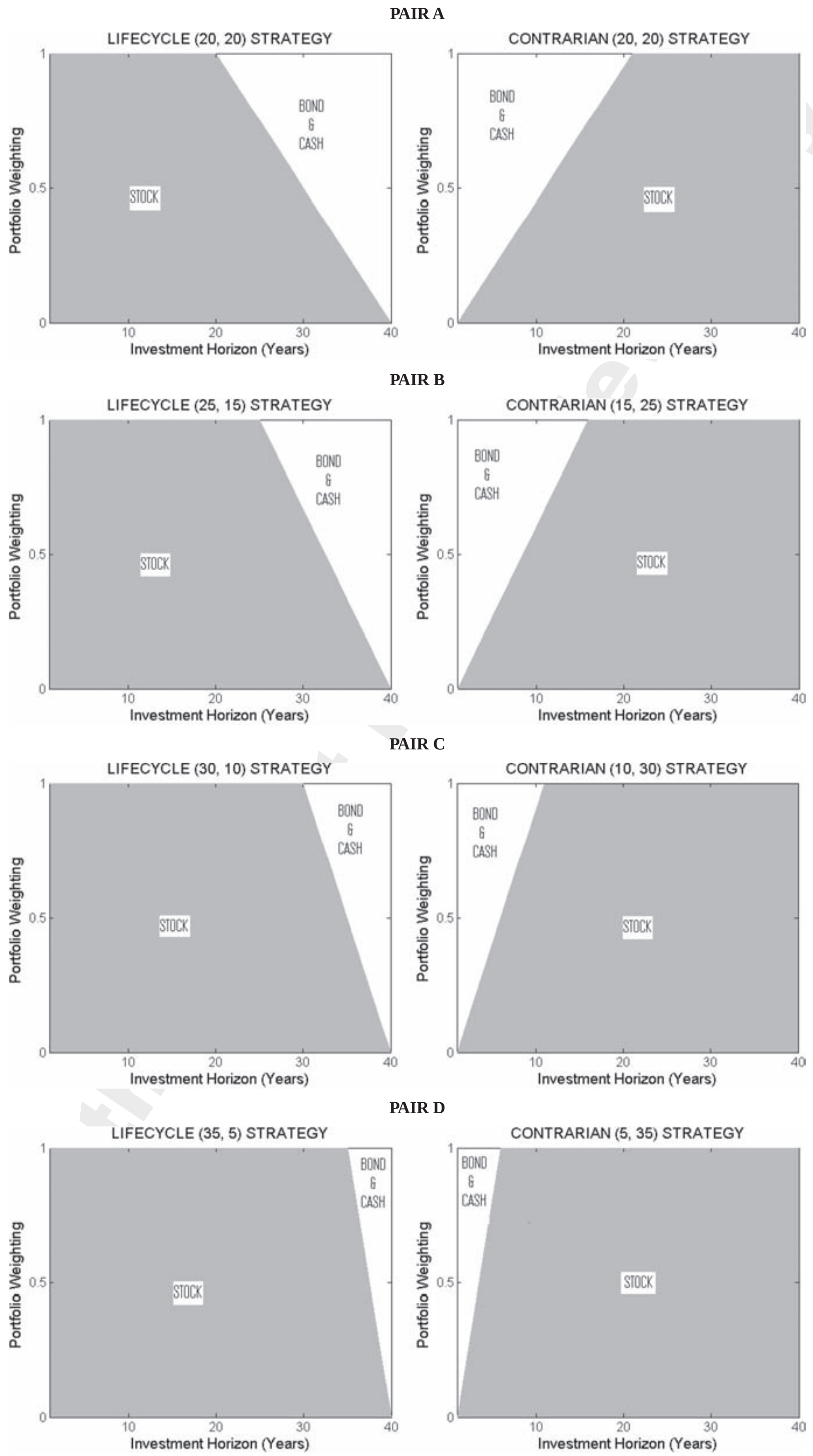


EXHIBIT 2
Terminal Value of Retirement Portfolio in Nominal Dollars

Strategy	Mean	Median	25th Percentile	75th Percentile
Pair A				
Lifecycle (20, 20)	1,420,332	1,160,225	793,371	1,724,852
Contrarian (20, 20)	1,959,490	1,425,387	838,796	2,435,856
CONT – LCYL (%)	38.0	22.9	5.7	41.2
Pair B				
Lifecycle (25, 15)	1,645,154	1,275,577	825,149	2,004,439
Contrarian (15, 25)	2,173,389	1,546,339	889,496	2,702,427
CONT – LCYL (%)	32.1	21.2	7.8	34.8
Pair C				
Lifecycle (30, 10)	1,909,918	1,411,168	876,711	2,355,363
Contrarian (10, 30)	2,335,373	1,587,699	909,020	2,864,003
CONT – LCYL (%)	22.3	12.5	3.7	21.6
Pair D				
Lifecycle (35, 5)	2,253,731	1,578,405	918,483	2,764,413
Contrarian (5, 35)	2,491,247	1,699,990	964,222	3,032,984
CONT– LCYL (%)	10.5	7.7	5.0	9.7

CONT– LYCL = Contrarian Strategy Terminal Value – Lifecycle Strategy Terminal Value (Expressed as a percentage of the lifecycle strategy terminal value.)

final wealth of $1,425,387. The median final wealth of the corresponding lifecycle (20, 20) strategy is $1,160,225, thus falling short by a whopping $265,162. The same margins for Pairs B, C, and D, are $270,763, $176,531, and $121,584, respectively.

We also compared the 75th and 25th percentile estimates, which represent the midpoint of the above-average and below-average outcomes, respectively. For the 75th percentile estimates, which are practically the medians of the "above-average" outcomes, the differences between the lifecycle and the corresponding contrarian portfolios grow even wider than those for median estimates. For Pair A, the 75th percentile outcome for the contrarian portfolio is about 41% larger than the lifecycle portfolio, translating into a wealth difference of more than $700,000. Even for Pair D, for which the results of the two strategies are closest, the contrarian portfolio is still better off by more than $250,000.

The 25th percentile estimates represent the medians of the "below-average" outcomes. Thus, it would be expected that the lifecycle strategies would perform better in the 25th percentile estimates, given that these strategies are specifically designed to protect the retirement portfolio against adverse market movements in the final years of the investment horizon. They certainly do better in terms of closing the gap, but are still not able to outperform contrarian strategies for any of the pairs. Even in Pair C, for which the two estimates are closest, the result for the contrarian strategy is almost 4% ($32,000) higher than that for the corresponding lifecycle strategy.

Although the dominance of contrarian strategies over their lifecycle counterparts is clearly visible for all pairs, the difference between the outcomes of the two strategies gets monotonically smaller moving from Pair A to Pair D. This outcome is expected as each subsequent pair of strategies has greater overlap, in terms of holding the same asset class at the same point on the horizon (i.e., identical allocation), than the previous pair. For example, at no point in time do the two strategies—lifecycle (20, 20) and contrarian (20, 20) strategies—in Pair A have an identical asset allocation. In stark contrast, the lifecycle (35, 5) and contrarian (5, 35) strategies in Pair D have an identical allocation for 30 years (between the 6th and 36th years), during which both are invested 100% in stocks. Thus, the result is that the final wealth outcomes are closer to one another than those produced by other pairs in which the lifecycle and contrarian strategies have shorter overlapping periods of identical allocation.

These results indicate that if the plan participant's objective is to maximize wealth at the end of the investment horizon, lifecycle strategies vastly underperform relative to contrarian strategies. Shiller's emphasis on exposing the portfolio in later years to the higher returns of the stock market seems to be a possible candidate in explaining the superior 40-year performance of the contrarian strategies. But to gain a proper understanding of the interaction between portfolio size and asset allocation, it is necessary to track the accumulation paths of the lifecycle strategies and their corresponding contrarian strategies in the early, middle, and final years. In other words, in order to obtain more compelling evidence of the size effect, we need to plot the simulated portfolios over the entire 40-year period.

Exhibit 3 depicts the accumulation paths over 40 years for each pair of lifecycle and contrarian strategies. Because showing all the 10,000 simulated accumulation paths for every strategy would make the plots visually unappealing and difficult to study, we display every 100th simulation result in these graphs. Thus, for every strategy, we effectively plot 100 simulated accumulation paths for visual comparison with those of its counterpart.[6]

For every lifecycle and contrarian strategy, the slopes of the accumulation curves generally steepen as they move along the horizon.[7] This seems to indicate that the potential for rapid growth in the retirement account balance comes only in the later years. What is striking in this respect is that every lifecycle strategy and its paired contrarian strategy display quite similar accumulation outcomes in the initial years, despite the contrast in their asset allocation structures. In fact, through the first half of the horizon (20 years), little distinction can be made between the accumulation patterns of the lifecycle strategies and the contrarian strategies, although lifecycle strategies seem to do slightly better. This may be due to the fact that lifecycle strategies share shorter overlapping periods of identical asset allocation with their contrarian competitors; for example, the lifecycle strategies in Pairs A and B. It is only when the accumulation plots move well beyond the half-way mark on the horizon that they start to look strikingly different. This seems to suggest that the accumulation balance in the retirement account during the initial years may not be very sensitive to the asset allocation strategy chosen by the participant.

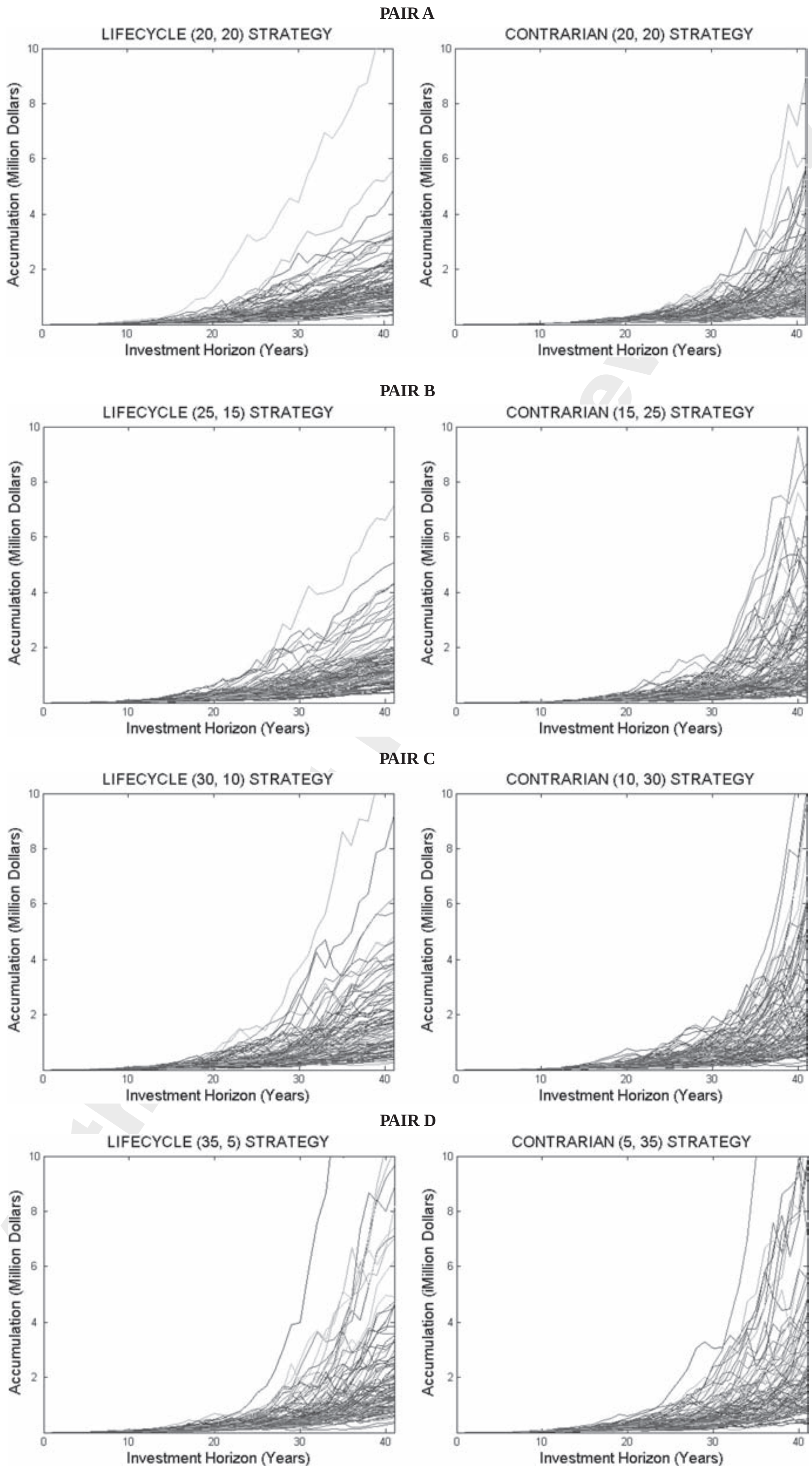
This finding confirms the importance of portfolio size growth along the investment horizon from the perspective of asset allocation. In the initial years, the size of the contributions is relatively smaller resulting in a smaller portfolio size. The return differentials between different asset allocation strategies during this period do not create large differences in the dollar value of the retirement portfolio. As the plan progresses along the investment horizon and the portfolio size grows larger, asset allocation assumes a more dominant role as small differences in returns result in large differences in accumulated wealth. The sensitivity of the absolute growth in accumulated wealth to the asset allocation becomes more and more pronounced in the final years before retirement when the size of the portfolio is larger than it was in the earlier years of the plan.

The slopes of the accumulation plots for lifecycle strategies and those for the corresponding contrarian strategies become conspicuously different during the later years of plan accumulation. In general, the accumulation values of the lifecycle portfolios gradually climb as the horizon progresses, while those of the contrarian portfolios display a steep ascent. This difference clearly demonstrates the effect of portfolio size on the terminal wealth outcome. By allowing the exposure of large portfolios to the stock market in later plan years, the contrarian strategies create opportunities for higher absolute growth in the accumulation balance.

A closer examination of the plots reveal that in many cases the contrarian portfolio values leapfrog over the lifecycle portfolios only at very late stages in the investment horizon, but still manage to result in huge differences in terminal portfolio value. For example, accumulation balances for the contrarian (20, 20) strategy in Pair A generally lag behind those of the lifecycle (20, 20) strategy for the best part of 40 years. In most cases, however, not only do they manage to catch up to the lifecycle portfolios in the final years before retirement, but actually leave them way behind by the time the investors reach the finish line.[8]

Yet, the fact that contrarian strategies are exposed to the possibility of serious market downturns close to the investor's retirement cannot be ignored. It is quite possible that the higher volatility of stock returns can result in large losses for contrarian strategies in later plan years and, therefore, very poor terminal accumulations. This is

EXHIBIT 3
Simulated Accumulation Paths over Investment Horizon



certainly evident from the sharp ups and downs in the accumulation plots for the contrarian strategies later in the horizon. Lifecycle accumulation plots, in contrast, generally seem to enjoy a relatively smooth ride during this period. But does this suggest lower risk for lifecycle strategies?

A possible approach for comparing the riskiness of the competing strategies would be to analyze the lower tail of the distribution, or the adverse wealth outcomes. If lifecycle strategies are less risky, they may generate better outcomes at the lower tail of the terminal wealth distribution compared to contrarian strategies. Exhibit 2 showed that the first quartile outcomes of contrarian strategies dominate those of lifecycle strategies in every case. Now, we compare various percentiles of distribution within the first quartile range that may be considered the zone of most adverse outcomes for the plan participant. Exhibit 4 tabulates the estimates for 1st, 5th, 10th, 15th, and 20th percentiles of the terminal wealth distributions under all strategies.

The estimates indicate that lifecycle strategies do produce better outcomes than their contrarian counterparts when only the outcomes in the lowest decile (10th percentile or below) of the distribution are considered. This outcome is not without exception, however. The 10th percentile outcome for the lifecycle (35, 5) strategy in Pair D is lower than that of the corresponding contrarian strategy. The difference between the outcomes for every pair is highest for the 1st percentile outcomes, and reduces gradually in the higher percentiles of the distribution. Remarkably, the final wealth under the contrarian strategies in the worst-case scenarios falls short of that of the corresponding lifecycle strategies by a margin that is far less than alarming considering the size of the overall accumulation. For 1st (and 5th) percentile measures, these margins range from a little more than $100,000 (and $75,000) for Pair A to about $37,000 (and $8,000) for Pair D. The difference between the outcomes seems to become less significant around the 15th percentile level, with the contrarian strategies resulting in slightly higher estimates for Pairs B and D. In the 20th percentile outcomes, the dominance of the contrarian strategies is clearly visible for all four pairs.

These results show that lifecycle strategies do not always fare better than the contrarian strategies, even in terms of reducing the risk of adverse outcomes. Only

EXHIBIT 4

Terminal Portfolio Values for Adverse Outcomes in Nominal Dollars

	Percentiles of Distribution				
Asset Allocation Strategy	**1**	**5**	**10**	**15**	**20**
Pair A					
Lifecycle (20, 20)	370,049	483,800	577,066	654,132	728,573
Contrarian (20, 20)	258,637	407,053	532,291	639,031	738,534
LCYL – CONT (%)	43.08	18.85	8.41	2.36	−1.35
Pair B					
Lifecycle (25, 15)	343,326	466,203	571,193	662,194	744,045
Contrarian (15, 25)	259,630	424,103	557,240	673,115	778,744
LCYL – CONT (%)	32.24	9.93	2.50	−1.62	−4.46
Pair C					
Lifecycle (30, 10)	318,211	470,271	585,107	685,409	781,134
Contrarian (10, 30)	249,829	434,660	567,613	682,174	803,828
LCYL – CONT (%)	27.37	8.19	3.08	0.47	−2.82
Pair D					
Lifecycle (35, 5)	301,184	455,267	589,409	700,323	817,011
Contrarian (5, 35)	264,326	446,592	600,863	719,279	843,420
LCYL – CONT (%)	13.94	1.94	−1.91	−2.64	−3.13

LYCL – CONT = Lifecycle Strategy Terminal Value – Contrarian Strategy Terminal Value
(Expressed as a percentage of the contrarian strategy terminal value.)

when we compare the 10th percentile (and below) outcomes—whose likelihood of occurrence is 1 in 10—lifecycle strategies fare slightly better. As a practical matter, it is very unlikely that investors would select a lifecycle asset allocation model with the sole objective of minimizing the severity of these extremely adverse outcomes—should they occur—because the cost of such action is substantial in terms of foregone wealth. For example, should the 10th percentile outcome be confronted at retirement, the plan participant would be better off by only roughly 8% by following the lifecycle (20, 20) strategy rather than the contrarian (20, 20) strategy. But should the 90th percentile outcome be confronted at retirement—which, of course, is as likely to happen as the 10th percentile outcome—the plan participant would be better off by 55% by following the contrarian (20, 20) strategy instead of the lifecycle (20, 20) strategy.[9] Obviously, the choice of one strategy over the other could be the deciding factor in whether the plan participant's retirement years are spent watching travel shows on television or actually holidaying in exotic destinations around the world.

The opportunity for risk reduction varies considerably among various lifecycle strategies. The ability to reduce risk appears to be greater for lifecycle strategies that start changing their asset allocation earlier in the investment horizon than those that do so later. For example, the 5th percentile outcome for the lifecycle (20, 20) strategy is almost 19% higher than that of the contrarian (20, 20) strategy. The same estimate for the lifecycle (25, 15), (30, 10), and (35, 5) strategies—which switch to conservative assets relatively later in the plan's life—vis-à-vis corresponding contrarian strategies shows 10%, 8%, and 2% better outcomes, respectively, which indicates a declining risk reduction advantage for lifecycle strategies that delay switching to conservative assets. Ironically, reducing the risk of extreme outcomes by switching early to conservative assets involves a very heavy penalty in terms of foregone accumulation of wealth. This becomes apparent from the variation in terminal wealth outcomes for the four lifecycle strategies in question.

CONCLUSION

The apparently naïve contrarian strategies which, defying conventional wisdom, switch to risky stocks from conservative assets produce far superior wealth outcomes relative to conventional lifecycle strategies in all but the most extreme cases. This demonstrates that the size of the portfolio at different stages of the lifecycle exerts substantial influence on investment outcomes and, therefore, should be carefully considered when making asset allocation decisions. The evidence presented in this article lends support to the view espoused by Shiller [2005a] that the growing size of the plan participant's contributions in later years calls for aggressive asset allocation—quite the opposite of the strategy currently followed by lifecycle asset allocation funds.

It is important to emphasize that we are clearly not suggesting that a retirement plan participant should follow any of the contrarian asset allocation strategies to allocate plan assets. We have formulated and used them in this article only to conduct a fair test of the hypothesis that by investing conservatively in the middle and later years of the participant's investment horizon, lifecycle funds work against the participant's investment objectives. Our results show that, in most cases, the growth in portfolio size experienced in the later years of employment seems to justify holding a portfolio that is at least as aggressive as that held in the early years. For some participants, that may well mean holding 100% stocks throughout the horizon.

By their own admission, financial advisors who recommend lifecycle asset allocation strategies focus on two objectives: maximizing growth in the initial years of investing and reducing volatility of returns in the later years. Our findings suggest that the bulk of the growth in value of accumulated wealth actually takes place in the later years. The first objective, therefore, has little relevance to the overarching investment goal of augmenting the terminal value of plan assets. We do find some support for pursuing the second objective of reducing volatility in later years to lessen the impact of severe market downturns, but this comes at the high cost of forfeiting significant upside potential. In other words, the effect of portfolio size on wealth outcomes over long horizons is so large that it outweighs, in most cases, the volatility reduction benefit of lifecycle strategies. Therefore, switching to less volatile assets a few years before retirement can only be rationalized if the plan participant has already accumulated wealth that equals or exceeds the retirement target.

If lifecycle strategies aim to preserve accumulated wealth, then sufficient accumulation has to be ensured in the retirement account before the recommendation is made to switch to more conservative investments. Unfortunately, this is not the case with the lifecycle funds currently used in DC plans. Currently available lifecycle funds switch from riskier to more conservative assets according to a predetermined mechanistic allocation rule, regardless of the actual accumulation in the account. Based on our findings, we have concluded that retirement investors would be better off by refraining from blindly adopting age-based investment strategies (lifecycle funds) that are keen on preservation even when there is not much to preserve.

ENDNOTES

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[1]Not all lifecycle funds change their asset allocation over time. Static allocation funds, which have the same exposure to various asset classes throughout the investment horizon, are also sometimes categorized as lifecycle or lifestyle funds. In contrast, the lifecycle funds we discuss in this article change their allocation over time and, therefore, are often referred to as age-based or target retirement funds. It is this type of age based lifecycle fund that has witnessed the highest growth in the last few years (Mottola and Utkus [2005]).

[2]For example, McEnally [1985] and Butler and Domian [1991] examined the effect, but reached different conclusions. This is, however, a result of the different measures of risk employed in these studies. The former viewed variability of terminal wealth as the risk measure and the latter used probability of stocks underperforming bonds and T-bills over long horizons as the risk measure.

[3]An exception to this is Hickman et al. [2001] who modeled the terminal value of a retired investor's portfolio to which contributions were made every month. The study assumed, however, that contributions remained equal throughout the horizon.

[4]An exception would be the case in which the average allocation of the lifecycle strategy to any asset class over the investment horizon exactly matches that of the fixed-weight strategy it is compared with.

[5]Information about precise asset allocation of existing lifecycle funds at every point on the horizon is rarely made available in the provider's prospectus. Our formulation follows the general direction of the switch and does not try to consciously replicate the allocation of any of the existing funds.

[6]We have chosen to use a linear scale over a logarithmic scale in plotting the accumulation wealth along the y-axis. This is motivated by our interest in absolute growth of the accumulation balance in actual dollars rather than percentage growth. Graphs using a logarithmic scale for the y-axis can be made available by the authors upon request. It should also be noted that a few extremely large accumulations for both lifecycle and contrarian strategies in the Pairs C and D do not completely fit in the graphs.

[7]This phenomenon is not unexpected because of the compounding of investment returns over multiple periods. Moreover, contributions are made to the retirement account every period and the size of the contributions grows larger every period under our assumption of constant growth in salary.

[8]Obviously, exceptions are visible in the diagrams of instances when an individual accumulation plot under the lifecycle strategy is able to beat those under the contrarian strategies.

[9]The 90th percentile terminal wealth estimates, although not provided in this article, are available from the authors upon request.

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