Target Retirement Accounts: Set it and Forget it?

By

Justin Look

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Professor Marti G. Subrahmanyam
Faculty Adviser

Professor Martin J. Gruber
Thesis Advisor

Abstract

With uncertainty surrounding the future of Social Security and the use of company pensions falling, the responsibility of future retirees to fund their own retirements could not be greater. Rather than have investors pour through the prospectuses of numerous investments, mutual funds offer target retirement accounts to simplify the retirement investing process. Marketed as a "one-stop shop" for retirement where the investor simply chooses the fund closest to their estimated retirement date, target retirement accounts provide ultra-diversification and an asset allocation that changes with the investor over time. This paper analyzes some of the qualitative and quantitative aspects of target retirement funds and finds they are not as simple as they are made out to be. Funds offered by different companies vary greatly in holdings, fees and strategy which lead to a wide range of returns. These returns were also found to be systematically lower than the returns of a standard index. Consequently, target retirement funds are not made for every investor and should be researched and monitored just as any other investment.

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Introduction

As the Baby Boomer generation prepares for retirement, a new era for the United States is being ushered in with a fundamental population shift that will result in an increased concentration of older individuals. In 2004, only 12.4% of the U.S. population (36.3 million people) was aged 65 or over. By 2030, this number is expected to nearly double to 20% of the population (71.5 million people)[1]. The aging of the population, coupled with longer life expectancies and the low birth rate of subsequent generations, will place enormous strains on the Social Security system, threatening its stability.

Possible cracks in the system are already starting to show, as exemplified by the worker-to-beneficiary ratio, one of the indicators used monitor the health of the system. This ratio has fallen from 16.5-to-1 in 1950 to 3.3-to-1 today. It is expected to fall further to 2-to-1 in the near future, a ratio at which there may not be enough workers to pay the scheduled benefits of retirees. Additionally, Social Security today replaces approximately 41% of pay for average-income workers and 56% of pay for low-income workers. According to Alicia Munnell of Boston College's Center for Retirement Research, by 2030 those numbers are expected to decrease to 27% and 29%, respectively[2]. While there is no danger of collapse in the imminent future, in its present state, the Social Security Trustees estimate all funds will be exhausted by 2041, at which point full benefits will no longer be able to be paid out[3]. As a result, Social Security needs to undergo serious reform that may involve measures such as higher payroll taxes for younger workers or reduced benefits for future retirees. In any case, the Social Security benefits enjoyed by current retirees are no longer a guarantee for those retiring in the future.

[1] Administration on Aging <http://www.aoa.gov/prof/Statistics/statistics.asp>
[2] Weston, Liz P. "5 critical fixes for 401(k) plans."
<http://moneycentral.msn.com/content/Retirementandwills/InvestYourSavings/P81706.asp>
[3] Social Security Administration <http://www.ssa.gov/qa.htm>

Similarly, traditional defined-benefit pensions are becoming more and more a thing of the past. In the 1980's, roughly 40% of the American workforce was covered by 112,000 defined-benefit pension plans. Today, that number has fallen to only 20% of the workforce covered by 31,000 plans. These numbers continue to worsen as many employers are "freezing" their pension plans or underfunding them, because of the huge financial obligations these plans represent[4]. While defined-benefit pensions are being replaced with defined-contribution plans and 401(k)s, future retirees no longer have a guaranteed monthly income stream.

So what does this mean for future retirees? Traditionally, for a comfortable retirement retirees depended on a "three-legged stool" consisting of Social Security, pensions, and savings[5]. With the uncertainty surrounding Social Security and the decline of pensions, future retirees can no longer depend on this model. Since two of these three legs weakened, retirement planning is changing and savings stands as the main component of retirement income. Gone are the days where retirees could depend on employers and the government for their retirement; they must rely on themselves.

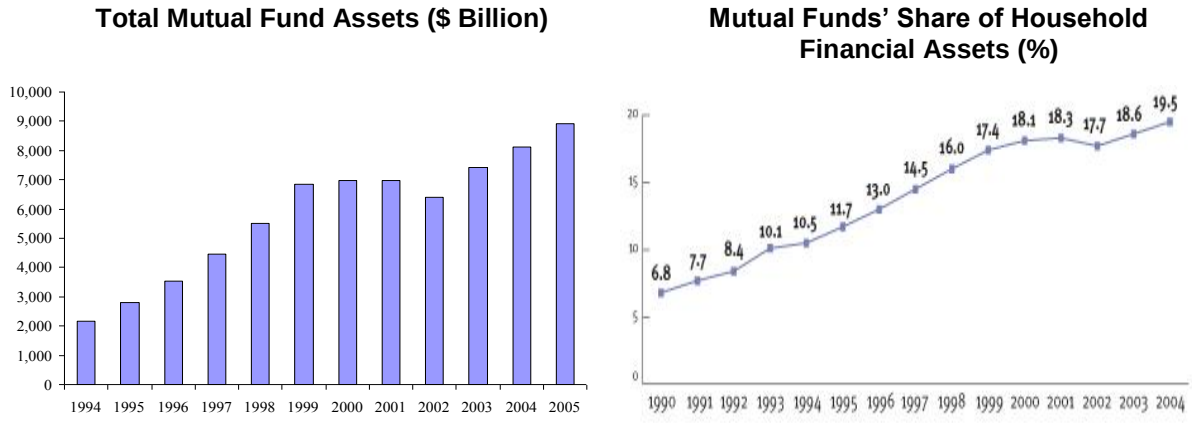
Mutual Funds and Retirement

Today's investors are aware of the importance of savings, which has been captured by the growth of mutual funds over recent years. As seen in Figure 1, total assets held in mutual funds have nearly tripled from $2.155 trillion in 1994 to $8.905 trillion in 2005. This trend continues today, with net assets jumping $25.9 billion in February 2006 alone to $9.219 trillion[6]. Not surprisingly, the increase in the total assets of mutual funds coincides with the steady increase of mutual funds as a percentage of household financial assets. As seen in Figure 1, the percentage

[4] Whelehan, Barbara. "Retirement plan trends don't favor workers." <http://www.bankrate.com/brm/news/BoomerBucks/20050202a1.asp>
[5] Social Security Administration <http://www.ssa.gov/qa.htm>
[6] Investment Company Institute <http://www.ici.org/stats/>

of household wealth mutual funds represent has increased nearly three-fold from 1990 to 2004, as mutual funds are increasingly being used for long-term savings[7].

Figure 1: Total Mutual Fund Assets and Mutual Funds' Share of Household Financial Assets

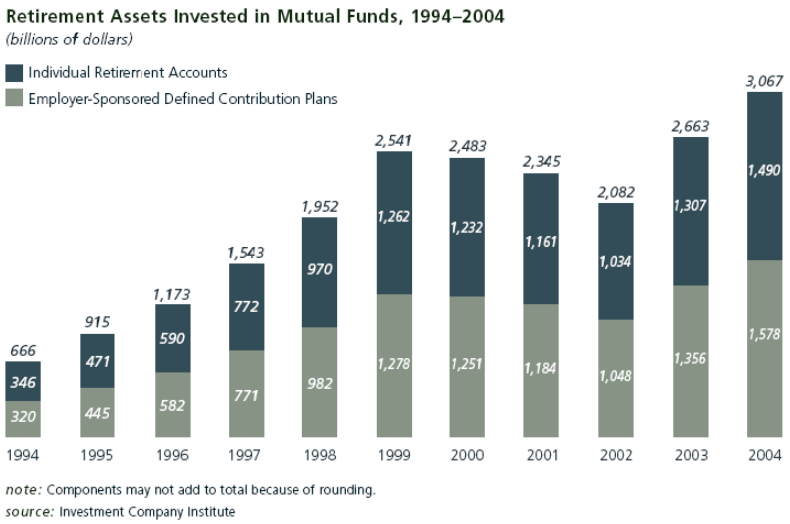


Sources: Investment Company Institute and Federal Reserve Board

One of the largest drivers of mutual fund growth has been retirement vehicles which, as seen in Figure 2, have quadrupled in assets since 1994. At the end of 2004, the $3.067 trillion invested in retirement assets represented approximately 40% of total mutual funds assets and accounted for 24% of the $12.9 trillion U.S. retirement market[8]. Additionally, during 2004, 60% of the $210 billion in new cash flow to stock, hybrid and bond mutual funds was invested through retirement accounts[9].

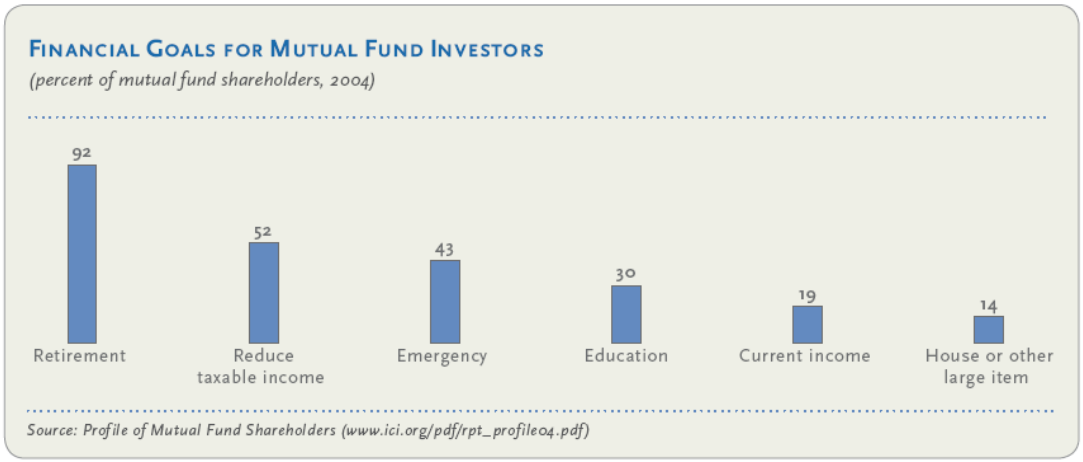
[7] Ibid.
[8] Investment Company Institute. 2005 Investment Company Fact Book. <http://www.ici.org/statements/ppr/05_ici_annual.pdf>
[9] Investment Company Institute. "Fundamentals: Mutual Funds and the U.S. Retirement Market in 2004." < http://www.ici.org/pdf/fm-v14n4.pdf>

Figure 2: Retirement Assets Invested in Mutual Funds, 1994-2004



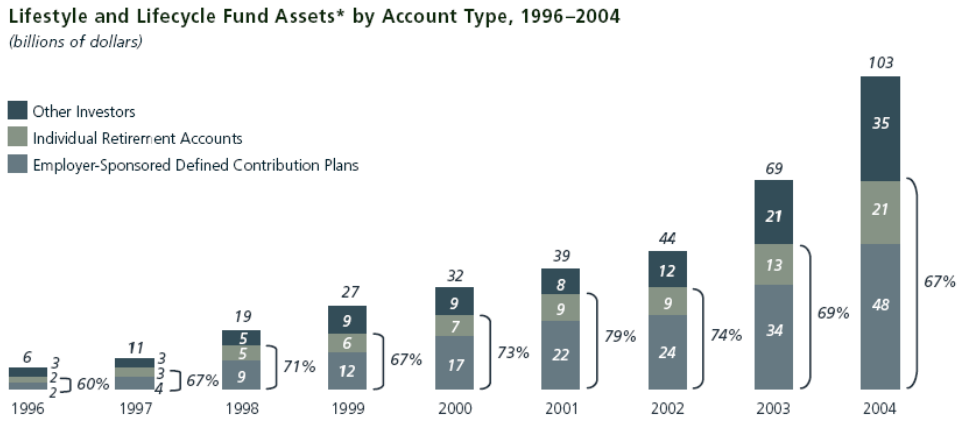
As seen Figure 3, an overwhelming 92% of mutual fund shareholders list retirement as a financial goal. Naturally, to capture this interest in retirement, mutual funds have tailored new fund options that are specifically geared towards retirement. These fund offerings often bear the word "Retirement" in their name, are easy-to-find on fund websites under a retirement heading, and try to be as simple as possible to make the investment process as painless as possible. A fairly recent, but popular innovation is lifecycle retirement funds, which are hybrid asset allocation funds.

Figure 3: Financial Goals for Mutual Fund Investors



Lifecycle funds were created in the 1990's to simplify the investing experience. These funds offer a preset mix of stocks, bonds, and cash holdings based on the investor's risk tolerance and/or estimated retirement date. Initially, when lifecycle funds were first offered they were very expensive and did not attract much attention from investors. In 1996, however, Fidelity began a campaign heavily advertising its lifecycle funds[10]. Slowly but surely, over the past few years lifecycle funds have increased in popularity with both investors and retirement fund sponsors. Other fund companies also flocked to the lifecycle phenomena with large fund families, such as Vanguard and T. Rowe Price, and smaller fund families, like AllianceBernstein, offering their own versions of these funds. As seen in Figure 4, assets in lifecycle funds have increased exponentially, from just $6 billion in 1996 to $103 billion in 2004.

Figure 4: Lifestyle and Lifecycle Fund Assets by Account Type, 1996-2004



Source: Investment Company Institute

Lifecycle mutual funds are basically offered in two flavors. Lifestyle lifecycle funds (also known as risk-based funds) are offered with aggressive, moderate, and conservative investing strategies. Investors choose funds based on their risk tolerance and the fund will more or less maintain the same asset allocation and risk strategy over the life of the investment. Should an investor's risk tolerance change, they have the ability to move their funds into the

[10] Morningstar <http://news.morningstar.com/classroom2/docID=2949&CN=COM>

fund with the corresponding risk profile. Target retirement lifecycle funds (also known as age-based funds), which are the focus of this paper, are offered based on retirement year. To invest in these funds, all investors need to do is choose the target fund closest to the year they plan to retire. The fund manager makes investment decisions and automatically adjusts asset allocations based on the target year chosen. The purpose of this study is to investigate these target retirement funds, analyzing their nuts-and-bolts, to see if they are as simple and worthwhile as mutual fund companies claim.

Target Retirement Funds

The desire for diversified, simplistic funds has generated phenomenal growth for target retirement accounts. In 2004, Lipper reported a 65% increase in target retirement assets to $43.9 billion[11]. Similar growth was reported in 2005, with assets growing by 60% to $70.1 billion[12]. To understand the magnitude of these numbers, consider that target retirement investments represented 5.6% of all fund sales in 2004 and 8.7% of all fund sales in 2005. These funds have had such an impact on the industry that Morningstar, one of the preeminent providers of mutual fund information, specifically created new categories for these funds. In March 2006, they launched the "Target Date 2000-2014," "Target Date 2015-2029" and "Target Date 2030+" categories to capture the different target retirement options available[13]. The main benefits these funds provide are simplification and automation which are explored further in the following sections.

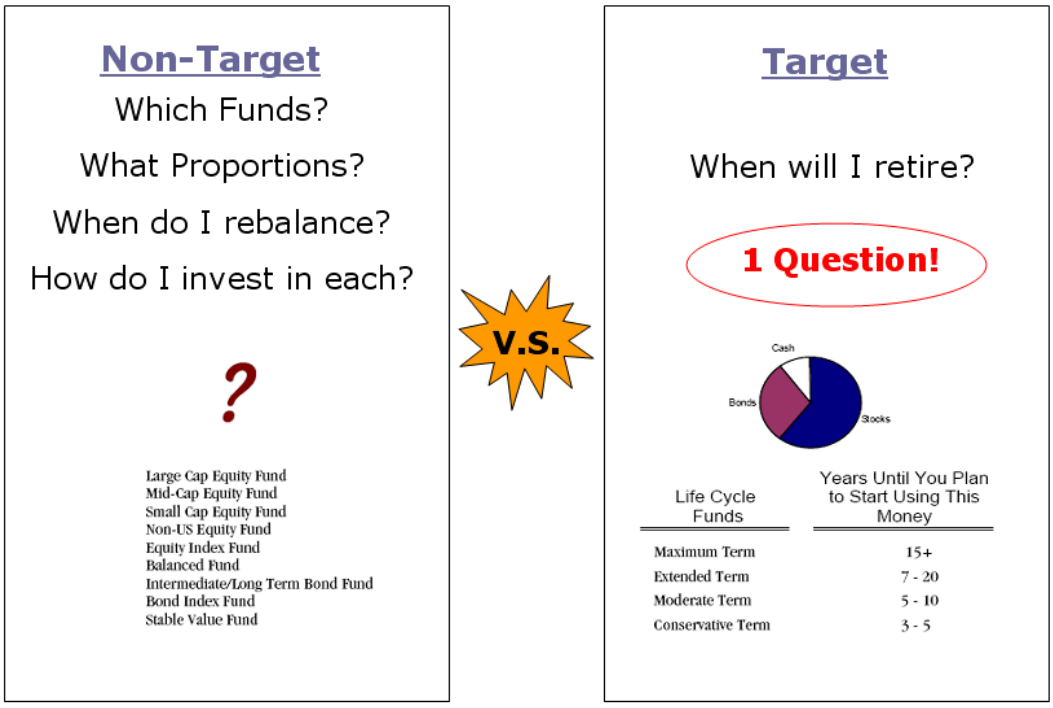
[11] CitiStreet <http://www.citistreetonline.com/pdfs/news/press_TargetFunds-FINAL_062205.pdf>
[12] Los Angeles Times <http://www.latimes.com/business/la-fi-wrap21.1mar21,1,4486213.story?coll=la-headlines-business>
[13] Morningstar <http://advisor.morningstar.com/articles/doc.asp?docId=4328>

Simplification

Perhaps one of the most beneficial aspects of target retirement funds is their attempt to simplify the investing process for the average investor by making the initial decision process easier and by taking the guess work out of investing. New investors can easily open this type of retirement vehicle without substantial knowledge of investing. Investors unwilling to spend time researching and monitoring their portfolio are provided with an easy, non time-consuming solution that does the work for them.

First, with the increasing number and complexity of investments, investors can easily become overwhelmed on where to put their money. Investors may not be aware of the differences between large-cap, mid-cap, or balanced funds, for example, much less understand the reasons for investing in each one or how to allocate their wealth between them. As seen in Figure 5, target retirement funds simplify the decision making process by leaving the investor with only one question to answer - what year they plan on retiring. Answering that one simple question provides them with a professionally managed and recommended asset allocation portfolio suited to their age, without having to go through the complicated and time consuming research of analyzing the different investments available. The cost of such a portfolio also comes at a fraction of the cost of an individual financial advisor. Moreover, since these target retirement funds are tailored to be *the one* investment for a retiree, by placing all of their savings into a target retirement fund, the investor's portfolio of stocks, bonds, and cash are all streamlined into a single account that can be easily monitored by the investor.

Figure 5: The Target Retirement Decision Process



Source: Manning & Napier Advisors

Next, a fatal flaw in the portfolio of many investors is their lack of diversification, which is the attempt to reduce an investor's exposure to unsystematic risk by investing in various companies, sectors, industries, and countries[14]. While investors may not know the exact terminology, they are aware of the principle behind diversification, exemplified by the adage "don't put all your eggs in one basket." By analyzing data from over 17,000 individual income tax forms for 1971, however, Blume and Friend (1975) find that the many investors often ignore this advice and maintain poorly diversified portfolios[15]. Since diversification demands a mix of uncorrelated assets, losses in one area can be offset by the concurrent gains in another. This is essential for retirement investing as it will help the portfolio achieve constant returns and prevent large negative swings.

[14] investorwords.com <http://www.investorwords.com/1504/diversification.html>
[15] Blume, Marshall E. and Irwin Friend. "The Asset Structure of Individual Portfolios and Some Implications for Utility Functions."

Target retirement funds attempt bestow the benefits of diversification to their investors by spreading their holdings over a myriad of investments. Many of the target retirement funds are "fund-of-funds," meaning they invest in other mutual funds or indexes. The Vanguard target retirement funds, for example, invest in six different Vanguard indexes. This process allows the investor exposure to securities across asset classes (equities, bonds, cash), sectors (information, service, manufacturing), and even different countries (Europe, Asia). Importantly, investors are given this benefit without any extra effort and a fraction of the cost they would have to pay if they tried to diversify a portfolio on their own. This is a tremendous benefit to both new investors unaware of diversification and to investors aware of the benefits but without the desire to construct it on their own.

Automation

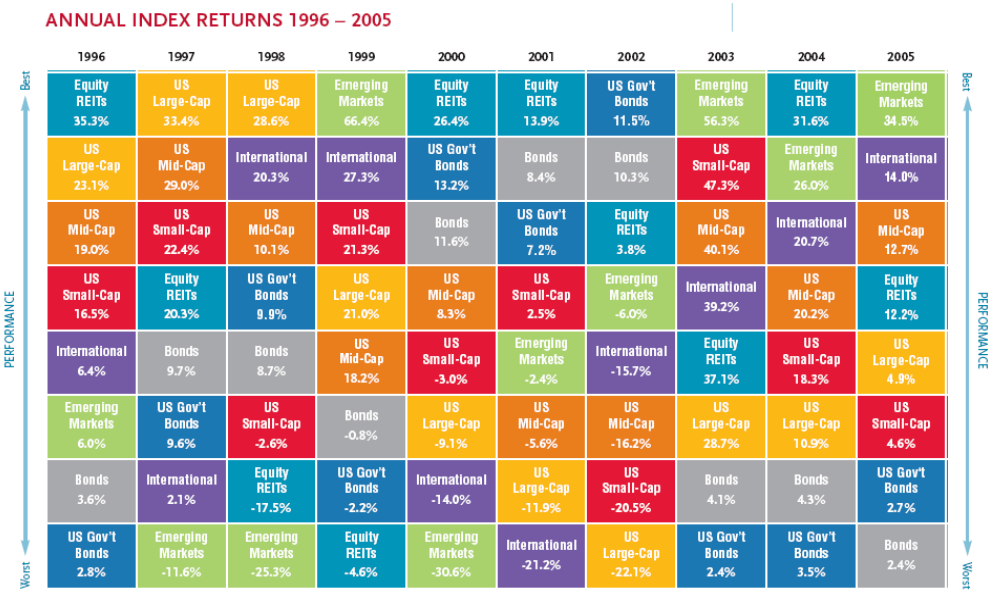
The other huge benefit of target retirement funds is their automation of the investment process. They remove the decision making process for the investor, as an experienced fund manager makes the important portfolio decisions of what to invest in, when to divest positions and when to change overall allocations.

Often, when left on their own, unseasoned investors make many investing mistakes. Odean (1999) finds many investors are often overconfident and buy securities that have risen or fallen more over the previous 6 months than the securities they sell, often holding losing positions too long. He also finds investors trade too excessively, which diminishes returns[16]. Similarly, Gruber (1996) finds that investors overreact to short-term performance, making rash decisions which can also hamper fund returns[17]. Having an experienced manager making the

[16] Odean, Terrence. "Do Investors Trade Too Much."
[17] Gruber, Martin J. "Another Puzzle: the Growth in Actively Managed Mutual Funds."

decisions prevents these miscues from occurring. Additionally, as seen in Figure 6, the top performing indexes change dramatically from year to year. Because of this, investors would be required to research and analyze trends to decide where best to allocate their funds every year. Target retirement funds allow investors to sidestep this time-consuming process, as the fund manager's team continually performs research to create a portfolio that maximizes different trends. The advantage of target retirement funds is demonstrated in a recent study by the consulting firm Hewitt Associates, which found do-it-yourself investors, on average, underperformed those who used target retirement funds. In 2004, target retirement investors enjoyed average returns of 11.6% compared to only 9.6% for the do-it-yourself investor[18].

Figure 6: Annual Index Returns 1996-2005



Source: Seligman Prospectus

Another area where automation benefits investors is during the asset allocation process. On their own, young investors only invest 59% of their money in stocks, with a large portion in company stock. A study by Vanguard shows, on average, investors in target retirement accounts

[18] Employee Benefit Research Institute <http://www.ebri.com/surveys/index.cfm?fa=retirement>

hold a greater percentage of their portfolio in stocks from their 20s to 50s compared to those investing on their own[19]. Target retirement accounts provide a more aggressive stance with over 80% of their portfolios in stock for young investors, preventing over-conservatism and allowing the portfolio to take full advantage of compounding.

Furthermore, a commonly held belief is that while young investors should be heavily invested in stock, older investors should invest in more conservative assets with low volatility since they are closer to using these investments to fund their retirement. While many investors are aware of the benefits of this portfolio rebalancing, history shows many investors do not follow this advice. A recent survey by Hewitt Associates, for example, shows during 2000 to 2004, more than 3 in 5 investors in 401(k) plans made no changes to their accounts[20]. Ameriks and Zeldes (2004) found similar results in their study of TIAA-CREF participants. Over a ten year period, they found 47% of the sample made no changes to the allocation of inflows, 73% of the sample made no changes to the allocation of existing assets, and 44% of the sample made no changes of either type[21]. In trying to explain these results, some surveys find people participating in employer-sponsored retirement plans often don't change asset allocations once they sign up because they don't know what or how to do it[22]. Poterba, Rauh, Venti and Wise (2005) postulate that investors may suffer from psychological biases that would lead them to neglect planned rebalancing. Incidentally, they find investors may be willing to pay additional expenses associated with target-year lifecycle funds in which the rebalancing happens automatically if it is difficult to conduct the research needed to rebalance on own[23].

[19] CitiStreet <http://www.citistreetonline.com/pdfs/news/press_TargetFunds-FINAL_062205.pdf>
[20] Employee Benefit Research Institute <http://www.ebri.com/surveys/index.cfm?fa=retirement>
[21] Ameriks, John, and Stephen P. Zeldes. "How Do Household Portfolio Shares Vary with Age?"
[22] Singletary, Michelle. "Managing Retirement, Automatically." <http://www.washingtonpost.com/wp-dyn/articles/A58288-2005Apr16.html>
[23] Poterba, James, Joshua Rauh, Steven Venti, and David Wise. "Lifecycle Asset Allocation Strategies and the Distribution of 401(K) Retirement Wealth."

Target retirement funds fill this void for investors with their automation of the rebalancing of asset allocations. Target retirement funds typically have 3 to 4 adjustment periods comprised of an accumulation phase, a transition phase, an early retirement phase and a late retirement phase. When investors are young, the fund risk profile is more aggressive and heavily stock-based in efforts to build up portfolio assets. As investor ages, the fund risk profile gradually becomes more conservative changing stocks for bonds in efforts to preserve portfolio assets. Moreover, the demand for these funds was confirmed in a recent Retirement Confidence Survey by the Employee Benefit Research Institute and Mathew Greenwald & Associates Inc. The survey found 66% of workers not contributing to employer-sponsored retirement plans claimed they would be more likely to if their companies offered a target retirement fund which grew more conservative as they approached retirement[24].

Literature Review

Before analyzing the target retirement options and their performance, a review of academic literature was performed to get a better framework of target retirement funds. The purported benefits these funds provide, in regards to diversification and asset allocation, are analyzed below.

Diversification

Many target retirement funds provide ultra-diversification, since they are "funds-of-funds," investing in numerous other funds within their family. This might seem like a good thing since a greater number of different investments would reduce unsystematic risk, but this mass diversification may not be necessary. Elton and Gruber (1995) find a well-balanced portfolio of

[24] Employee Benefit Research Institute <http://www.ebri.org/pdf/PR_692_5Apr05.pdf>

1,000 stocks could reduce the portfolio's standard deviation to 19.2%. Importantly, however, they find a portfolio of only 20 stocks can achieve almost the same results, reducing the standard deviation to 20%. The addition of the 980 stocks only reduced the portfolio risk by .8%[25]. So while adding more and more investments can reduce risk, there gets to a point where there is no significant benefit towards further diversification. Moreover, since many of these target retirement funds are "fund-of-funds," their performance is only as good as the family's lineup of large-cap, small-cap, international and other funds. No matter how diversified the target fund is, if its underlying holdings are poor no amount of diversification will improve its results.

Moreover, Elton, Gruber and Green (2004) find that mutual fund returns are closely correlated within individual fund families. With family funds often having similar holdings and fund managers having access to the same research, sharing similar market outlooks, and essentially following the same strategies, these highly correlated returns can reduce the benefits of investor diversification[26]. This may be a huge problem for target funds. In Fidelity's Freedom Funds, for example, they hold 24 other Fidelity funds. Of these 24 funds, three are large-blend and three are large-growth. Investors might want to question the necessity of having three each of the same fund types as their holdings and returns are bound to be highly similar.

Lastly, Chen, Hong, Huang, and Kubik (2002) find that fund returns decline with fund size. A possibility for this result is that smaller funds are better than larger ones at investing in small, local companies that have the potential for high growth[27]. Target retirement funds have billions in assets and are invested across many different assets. While having ample diversification can buffer these fund from performing poorly, it can also prevent a fund manager

[25] Elton, Edwin J., and Martin J. Gruber. Modern Portfolio Theory and Investments.
[26] Elton, Edwin J., Martin J. Gruber, and T. Clifton Green. "The Impact of Mutual Fund Family Membership on Investor Risk."
[27] Chen, Joseph, Harrison Hong, Ming Huang, and Jeffrey D. Kubik. "Does Fund Size Erode Performance? Liquidity, Organizational Diseconomies and Active Money Management."

from outperforming passive indexes because of their exposure to so many different areas. Consequently, investors looking for high returns may be disappointed when investing in on of these funds; these funds will probably not make them rich.

Asset Allocation

Target retirement funds are essentially asset allocation funds with a rebalancing feature. Accordingly, to get a better understand of these funds it would be interesting to see the work of what others have done regarding asset allocation.

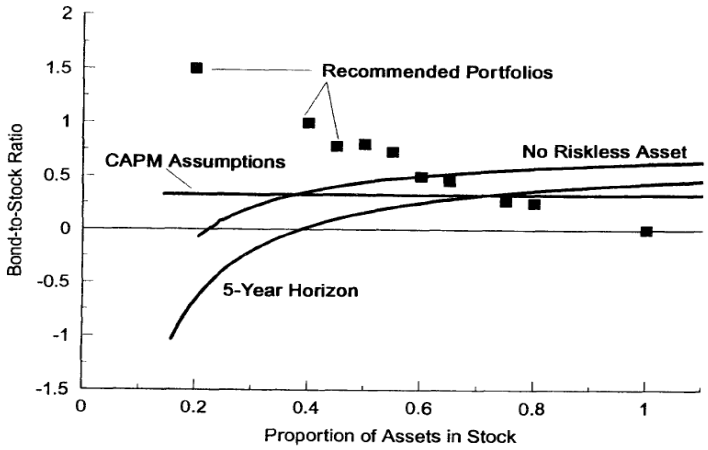
One of the most cited works regarding the importance of asset allocation is by Brinson, Hood, and Beebower (1986). In their study of 91 large pension plans from 1974-1983, they found asset allocation on average explained 93.6% of variation in total plan return[28]. Brinson, Singer, and Beebower (1991) followed up that paper with a study of the impact of passive and active allocations on 82 large pension funds from 1977-1987, and found asset allocation on average explained 91.5% of the variation in actual returns[29]. Janke (1997) emerged as one of the most vocal critics of these two papers, criticizing the findings to the degree of what the results meant and showing how the findings of the papers were often misquoted and misused by mutual fund companies. While he agrees with the assessment of the importance of asset allocation in determining portfolio performance, he disputes the figures used and argues the appropriate classes, weights and determination of the allocations are still undetermined[30].

Much work concerning asset allocation followed, with many analyzing the process financial advisors use in determining their allocation recommendations. Canner, Mankiw, and Weil (1997) analyze the mutual fund separation theorem which says more risk-averse investors

[28] Brinson, Gary P., L. Randolph Hood, and Gilbert L. Beebower. "Determinants of Portfolio Performance."
[29] Brinson, Gary P., Brian D. Singer, and Gilbert L. Beebower. "Determinants of Portfolio Performance II: an Update."
[30] Jahnke, William. "The Asset Allocation Hoax."

should hold more of their portfolios in the riskless asset. Importantly, they note the composition of risky assets (stock-to-bond ratio) should be the same for all investors. In their research they find financial advisors systematically do not adhere to this principle, as their recommendations lead risk-averse investors to hold a higher ratio of bonds than stock, shown in Figure 7. They analyze possible explanations for the behavior of these advisors, but ultimately find their explanations and results unsatisfactory[31]. Elton and Gruber (1999) followed up on the work of Canner, Mankiw, and Weil and find the advice of financial advisors is not inconsistent with modern portfolio theory. They find that if short sales are not allowed (assume advice doesn't include short selling) the bond-to-stock mix can increase or decrease as risk increases over low risk levels, but the bond-to-stock mix *must* decrease as risk increases over high levels[32].

Figure 7: Optimal and Recommended Portfolios



Source: Canner, Mankiw, Weil – "An Asset Allocation Puzzle"

In determining the optimal mix of asset allocations over the lifecycle, the jury is still out. A general rule of thumb is to put (100 - age) % in stocks, but this is a very rough guide. The first school of thought advocates constant allocations throughout one's lifetime. Samuelson (1969) argues there is no real difference between a young businessman and a widow, as they should have the same relative risk tolerance whether in the prime of life and near the end. He argues

[31] Canner, Niko, N. Gregory Mankiw, and David N. Weil. "An Asset Allocation Puzzle."
[32] Elton, Edwin J., and Martin J. Gruber. "The Rationality of Asset Allocation Recommendations."

there is no "chance to recoup" loss and the tendency for law of large numbers is not relevant[33]. Merton (1969) found similar results that the optimal portfolio would not change allocation to stocks through time, but he makes the important disclaimer that this only holds in the absence of labor income[34].

Continuing this research, Bodie, Merton, Samuelson (1992) find that labor income plays a critical role in the specification of a life-cycle portfolio. Therefore, since younger people have a large part of their wealth in human capital compared to older people, the optimal allocation should not remain constant[35]. Two opposing views stem from this work, one advocating a low initial exposure to stocks that increases over time and the other advocating a high initial exposure to stocks that decreases over time. On the one hand, Benzoni, Dufresne, and Goldstein (2005) find that since labor income is subject to significant idiosyncratic shocks, it is a highly leveraged security with large implicit exposure to the market portfolio so the initial allocation of stocks should not be that high[36]. Lynch and Tan (2004), therefore, make the suggestion that it might be best to invest only 20% in stocks, with an *increasing* allocation to stocks as the investor ages (assume correlation of labor income with stock returns)[37]. This goes against the traditional view of a decreasing allocation of equities in one's lifetime. On the other hand, Viceira (2001) finds young individuals should place 300% or more of portfolio in stocks. His reasoning arises from the superior return performance of 100% stock portfolios compared to other combinations and he suggests that individuals borrow heavily to invest in stocks while young[38].

[33] Samuelson, Paul. "Lifetime Portfolio Selection by Dynamic Stochastic Programming."
[34] Merton, Robert C. "An Intertemporal Capital Asset Pricing Model."
[35] Bodie, Zvi, Robert C. Merton, and William F. Samuelson. "Labor Supply Flexibility and Portfolio Choice in a Life-Cycle Model."
[36] Benzoni, Luca, Pierre Collin-Dufresne, and Robert S. Goldstein. "Portfolio Choice Over the Life-Cycle in the Presence of 'Trickle Down' Labor Income -Working Paper 11247."
[37] Lynch, Anthony W., and Sinan Tan. "Labor Income Dynamics At Business-Cycle Frequencies: Implications for Portfolio Choice - Working Paper 11010."
[38] Viceira, Luis. "Optimal Portfolio Choice for Long-Horizon Returns with Non-Tradable Labor Income."

While there is no agreed upon approach towards lifecycle asset allocation, the majority of target retirement funds share the same strategy of placing a heavy allocation of the portfolio in stocks while the investor is young and gradually decreasing this amount in favor of bonds and cash as the investor ages. Even though this may be agreed upon by the mutual fund companies, preliminary work by Shiller (2005) shows some rather distressing results. Shiller conducted simulations of outcomes of target funds plans based on U.S. financial data from 1871–2004. His target portfolio began with an 85% allocation in stocks that lasted until age 30, at which point the allocation declined linearly to 20% in stocks at age 60 and remained flat thereafter. His results showed the median IRR of the lifecycle funds is only 3.4% compared to 5.9% that could be obtained with a 100% stock portfolio[39].

Since the U.S. economy has multiplied exponentially in recent decades, a rate which Shiller believes cannot continue in the future, he re-ran his simulation with a less optimistic outlook and reduced historic returns by 2.2% each year. His results led to a median IRR of only 2.6% compared to 3.7% for the 100% stock portfolio. His reasoning for the target plans performing worse than 100% stocks portfolio is that young people have relatively little income when compared to older workers. The target portfolio would be heavily invested in the stock market in the early years, but for a relatively small amount of money. As the investor ages, the target portfolio pulls out of the stock market, but this comes at a time when the investor's earnings are at its peak. Not having a high investment in stocks during this time where most of the portfolio's value is generated hampers the returns of the target portfolio[39].

All in all, the differences in opinion of the authors lead to one conclusion that basically everyone agrees on; as of yet there is no optimal asset allocation mix that guarantees superior returns. Today, work continues to be done on this subject through the numerical computing of

[39] Shiller, Robert J. "Life-Cycle Portfolios as Government Policy."

today's advanced computers and through the use of advanced mathematics, but the intricacies and nuances of individual investors may prevent a solution from ever being found.

The Data

Creating the Sample

The main source of data used for this paper comes from the Library Edition of Morningstar.com. By using the Morningstar Screener, the initial data set was compiled screening under "General - Special Fund Types" setting the condition "Lifecycle Funds = Yes." The resulting funds included both lifestyle and target retirement funds, so funds not in the Morningstar category of "Target Date 2000-2014," "Target Date 2015-2029" and "Target Date 2030+" were deleted. From here on out, these categories will be described by the target year (i.e. 2000-2014). Within these three categories there were a total of 455 funds. Although not all 455 were unique funds, they were used for basic sample statistics of the available choices for investors. The reason all of the funds were not unique is because many fund families offer different share classes for a fund, either to distinguish institutional investors or to charge different combinations of fees/minimums. Since these different classes share the same net assets, to analyze the data and assess trends, the sample was further reduced to avoid double counting duplicate funds. Using the Center for Research in Security Prices Database (CRSP), the inception dates for all shares of duplicate funds was collected and only the share with the longest history was kept.

The resulting dataset consisted of 117 unique funds offered by 20 different families. There were 40 funds in the 2000-2014 category, 35 funds in the 2015-2029 category and 42 funds in the 2030+ category. Importantly, 12 of the funds in the 2000-2014 category were removed because they represent the Income Fund of the family, or target allocation of the target

retirement funds after they have stopped reallocating their portfolios. Since this study is interested in the rebalancing funds, these 12 funds were removed, leaving 28 funds in the 2000-2014 category. This left a data set of 105 funds offered by 19 different families. In viewing the data, it was apparent that many of the families offered funds in each of the different categories, presumably to provide its investors with a complete list of options.

Methodology

To analyze the data, the retirement funds were analyzed in their respective categories rather than comparing them all together. This was largely done because although the nature of the funds is similar, the strategies and consequently their structures and performance can be very different. The 2000-2014 category contains funds suited for people that are retired or are nearing retirement. Since the time to retirement is small or over, rather than building the portfolio assets, these funds attempt to preserve the portfolio. Since they do this through heavier concentration of assets in cash and bonds, with less concentration on stocks, smaller returns are expected. The 2015-2029 category features funds in the transitional phase, as most of their investors are midway or more through their careers. These funds still attempt to grow assets through stock holdings, but they are also ramping up assets in bonds and cash, so moderate returns are expected. Lastly, the 2030+ category is for individuals just starting their careers, with retirement in the distant future. Since there are many years until the target date is actually reached, these funds are nearly all stock based with the goal of building assets as much as possible, so high returns are expected.

While separating the target retirement funds into categories makes sense due to their different strategies, it did create another problem. Given that target retirement funds are a relatively new creation, not surprisingly, there were very few funds with a significant amount of

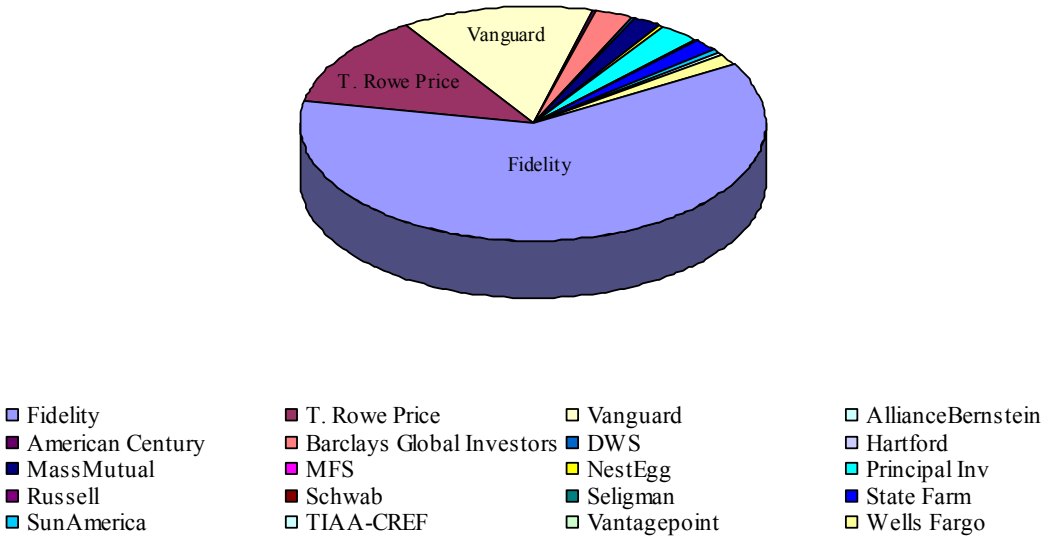
return data. Of the 105 target retirement funds, 56 of the funds had more than a year of history and only 26 of the funds had a history of at least five years. Moreover, 21 funds were created in the past year alone. To compensate for the lack of historical data, the target funds are viewed over 4 different time horizons to try to get as much information as possible and to see if the results are robust. As a result, the trailing 5 Year, 3 Year, 1 Year and YTD horizons are used for much of the paper. Due to the newness of these categories, the 5 Year and 3 Year periods have very little data, but will still be analyzed nonetheless.

The nuts and bolts of the funds were taken primarily from Morningstar, and checked against Yahoo! Finance and the CRSP database. All data compiled was taken as of February 2006, with the exception of the YTD returns which were taken as of March 31, 2006. The sample does suffer from survivorship bias, as some target funds have been absorbed into the Income Fund of their family as they have already reached their final target allocation. This does not have a huge impact, since this paper analyzes a snapshot of the current offerings available and only serves as a preliminary look at target retirement funds.

Upon a review of the total assets held by different funds, it quickly became apparent that three fund families dominate the target retirement arena. As seen in Figure 8, Fidelity, T. Rowe Price, and Vanguard represent most of the market, holding over 85% of the total assets invested in target retirement accounts over the three categories. Presumably, as one of the earliest adopters of target retirement funds in 1996, Fidelity has enjoyed significant first-mover advantage. It has amassed over $46 billion in its Freedom and Advisor Freedom funds, which represent 50.97% of the total assets held in target retirement funds. Similarly, T. Rowe Price and Vanguard were two of the other largest fund families to offer target retirement funds starting in 2002 and 2003, respectively. T. Rowe Price's high-performing funds and Vanguard's low-

priced offerings have each allowed them to accumulate approximately $10 billion, or 13% of total target retirement assets each, in their respective accounts. While weighted averages of the data may have better represented the information, due to the heavy allocation towards these 3 companies, raw averages were used to get a better idea of the differences offered to investors across different companies.

Figure 8: Target Retirement Mutual Fund Market Share by Total Assets



Comparing Offerings Between Companies

Fund families claim that to invest in target retirement funds, an investor only need to choose their expected retirement date. To see if this was the case, the offerings between different companies were compared, to search for other areas investors might want investigate. In some of the areas identified, characteristics that made one fund perform better than others were also examined. This process began with analyzing qualitative information from the literature of the fund families themselves, including their websites, prospectuses, and annual reports. This was combined with a quantitative analysis of the "nuts and bolts" of the funds using historical data of the funds. The combination of these two information sets allowed for the analysis below.

Portfolio Construction

While these target funds are very easy to invest in, not all funds are the same across different fund families. First, not all funds diversify in the same manner. As seen in Table 1, the top 5 holdings of all funds differ in their combinations. While the overwhelming majority of the target retirement funds are "fund-of-funds" that invest in only in the funds offered by their family, there are some funds that offer unique alternatives. Some funds like the Wells Fargo Advantage Outlook Series invest in individual stocks like ExxonMobile. Other funds like AllianceBernstein and Seligman invest in REITs (Real Estate Investments Trusts) which are not held by any other fund. The Seligman fund family invests in ETFs (Exchange-Traded Funds) that track specific securities index or basket of securities. The AIG SunAmerica High Watermark funds invest in S&P 500 Index futures contracts instead of individual stocks. Interestingly, these SunAmerica funds are the only ones that offer investors who hold shares to maturity guaranteed principal plus the highest level of investment gains achieved during the life of the funds. Due to these large differences, investors must decide which type of investments they feel most comfortable with holding in their portfolio.

Table 1: Top 5 Holdings of Target Retirement Funds

Top 5 Holdings	Obs
Treasuries	8
Stocks/Treasuries	12
Index Funds	18
Index Funds/Treasuries	2
Family Funds	77

Next, while the general rule of thumb might be to put (100 – your age) % in stocks, target retirement accounts vary greatly in the allocations of their portfolios. As seen in Table 2, generally with the more years to retirement, the more aggressive the average portfolio holdings

of the funds are. The 2000-2014 funds had the highest percentage of assets in cash and bonds, but the lowest percentage of assets in stocks. The 2030+ funds were just the opposite, with the highest percentage stock, but the lowest percentage of assets in cash and bonds.

Table 2: Average Asset % Breakdown by Category

Target Date	% Cash	% Stock	% Bond	% Other
2000-2014	10.80%	39.60%	47.10%	0.70%
2015-2029	7.70%	63.20%	28.40%	0.70%
2030+	4.10%	82.80%	12.40%	0.70%

Before investing in the target fund of a particular family, the investor should make sure that their risk tolerance is matched by the fund. The percentage of stocks held is usually used to determine the aggressiveness of the fund, with a higher percentage of stock indicating an aggressive fund and a lower percentage of stocks indicating a conservative fund. To analyze the aggressiveness of target fund options, funds were grouped by percentage of stock held as seen in Table 3. Three outliers were the SunAmerica 2010, 2015, and 2020 funds which invest in no stock and were the only observations with stock holdings >20%.

Table 3: Average % Stock Breakdown by Category

Stock %	2000-2014 Obs	2015-2029 Obs	2030+ Obs
X ≤ 20%	1	2	0
20% < X ≤ 40%	10	0	0
40% < X ≤ 60%	14	11	1
60% < X ≤ 80%	3	17	15
80% < X ≤ 100%	0	5	26

For the 2000-2014 funds, with the SunAmerica 2010 fund removed, the stock range was 23.1% to 66.4% with half of the funds in the 40% to 60% category. Since the rule of thumb for retirees between 2000-2014 would be 29% to 43% (assuming a 65 retirement age), 9 funds fall within this category. The remaining 17 funds are weighted more heavily towards more aggressive balances. Similarly, for the 2015-2029 funds, with the SunAmerica 2015 and 2020 funds removed, the stock range was 46.0% to 66.4% with half of the funds in the 60% to 80%

category. Since the rule of thumb for retirees between 2015-2029 would be 44% to 58% (assuming a 65 retirement age), 8 funds fall within this category. The remaining 27 funds are weighted more heavily towards more aggressive balances. Finally, for the 2030+ funds, the percentage of stock allocated ranged from 58.5% to 98.5% with more than half of the funds in the 80% to 100% category. Since the rule of thumb for retirees 2030+ would be 59% or higher (assuming a 65 retirement age), all funds fall within this category. This exercise shows that a majority of the funds hold similar stock allocations but there are riskier and more conservative options that the investor can choose. Consequently, investors should choose a portfolio with a stock allocation that matches their risk profile.

Last but not least, investors may also want to identify the amount of foreign stocks in their target retirement portfolio. Simply analyzing the Top 10 and Bottom 10 funds by foreign stock percentage in their portfolios compared with YTD returns, we can see that funds with higher foreign stock percentages are greatly outperforming those with lower foreign stock percentages. This outperformance is probably due to the boom foreign equities have received of late. Nonetheless, investors should find a portfolio whose foreign stock holdings match their future expectations and optimism about foreign markets.

Table 4: Top 10 and Bottom 10 funds Based on Foreign Stock % vs YTD Returns

	2000-2014 Bottom 10	2000-2014 Top 10	2015-2029 Bottom 10	2015-2029 Top 10	2030+ Bottom 10	2030+ Top 10
Foreign Stock %	2.0%	14.7%	8.0%	22.9%	14.0%	27.0%
YTD Return	0.88%	3.89%	2.89%	6.48%	5.07%	7.05%

Table 5: Foreign Stock % Statistics by Category

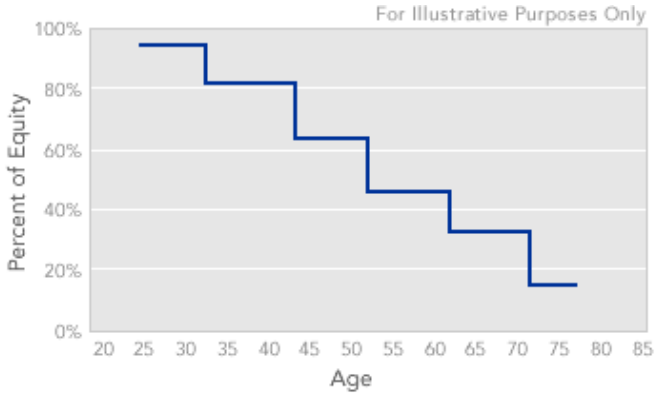
	2000 - 2014	2015 - 2029	2030+
Average % Foreign Stock	8.33%	14.97%	19.53%
% Foreign Stock σ	6.38%	6.84%	5.57%
Median % Foreign Stock	8.20%	14.90%	18.45%
Minimum	0.00%	0.00%	11.90%
Maximum	23.90%	31.10%	34.00%

Portfolio Adjustment

One of the main attractions of the target retirement funds is their rebalancing aspect. Initially, all funds start off with a target allocation. For young investors, these portfolios would be in the 2030+ category, as it is heavily stock-weighted to generate large returns. Over the years, as the investor ages, the target allocation becomes more and more conservative. When the investor nears or hits retirement, the allocation matches that of the Income Fund of the family and the portfolio stops rebalancing. The Income Fund is very bond and cash heavy and is meant to preserve the portfolio as the investor draws out funds for their retirement income. While this process is desirable for many investors, the process of getting from initial to final allocation is dramatically different across fund families.

Some companies offer a "step down" approach which is a series of allocation levels that are held for a few years, as seen in Figure 9. A potential problem of this approach is that it leaves the investor exposed to a certain risk set for a long period of time, which may affect ending earnings if there is an extended period of poor returns.

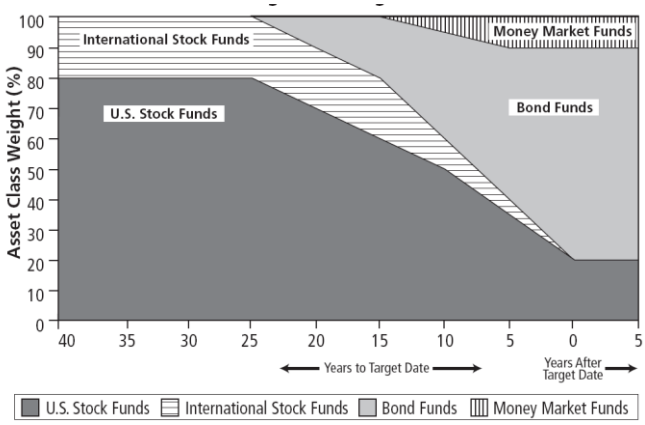
Figure 9: Step Down Rebalancing Method



Source: Fidelity Website

Other companies follow the "Straight Line" approach, similar to that used by MFS, which starts at an initial allocation level and moves in a straight line towards the final allocation, as seen in Figure 10. This also leads to problems, however, as stocks may not be kept in the portfolio long enough. Ultimately, this might leave the investor with a smaller ending investment as more risky investments were forgone in their earlier years, not allowing for the benefits of compounding.

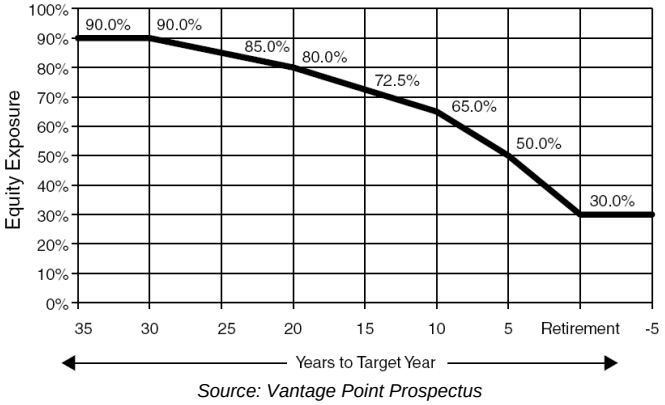
Figure 10: Straight Line Rebalancing Method



Source: MFS Prospectus

A combination of these two methods is also possible, as in Vantagepoint Milestone funds, which are stepped with straight line movement, as seen in Figure 11. This may suffer from both of the problems of the other funds.

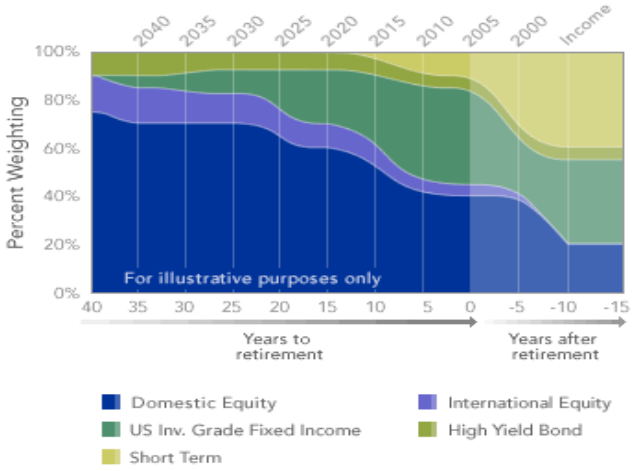
Figure 11: Combined Rebalancing Method



Source: Vantage Point Prospectus

The last approach is a gradual "Rolldown" like Fidelity's Freedom funds, which is a smoothed combination of all approaches, seen in Figure 12. This approach, however, may not be aggressive enough to benefit from the high returns of stocks during the later years.

Figure 12: Rolldown Rebalancing Method



Source: Fidelity Website

While no method is a proven success, investors should be aware of the differences and choose the approach that best suits their goals.

In addition to how this rebalancing process occurs, there are the issues of when the final target allocation is reached and what the final target allocations are. The fund offerings run the gamut of when final allocations are reached. American Century funds are extremely conservative, reaching their final allocation 1 year before the target date of the fund. Similarly, MFS, Barclays, and Vantagepoint, reach their final allocation the year of the target date of the fund. Vanguard and Fidelity are a little more aggressive, reaching their final allocation 5 and 10 years after retirement. AllianceBernstein and Schwab are even more aggressive, reaching their final allocations 15 and 20 years after retirement. T. Rowe Price has the most aggressive stance, with its funds reaching their final allocations 30 after retirement. Based on the investor's life expectancy outlook, they should choose a fund that they believe will last them throughout their lifetime.

Finally, there is the issue of the final allocations of the portfolios. Aggressive outlook funds like AllianceBernstein and American Century hold 60% and 45% in equities at the end of their rebalancing. Funds like TIAA-CREF and Vantagepoint are more moderate with a 35% and 30% in equities at the end of their portfolio. Russell and Schwab funds are more conservative, with only 20% in equities at the end of their portfolio. With most people in their 60's living for 20 or 30 more years, the final asset allocation can have a huge impact. A heavy stock allocation in advanced years may leave the investor with enough income to live comfortably for the rest of their lives, but it can also be depleted should a market downturn occur. A light allocation of stock in advanced years may shield the investor from market fluctuations, but it also leaves them in danger of running out of funds and not being able to maintain their desired lifestyle.

Loads Fees

Target retirement funds have the same basic goal and strategy, but the fees charged for these services can greatly differ. Two fees investors should look for are front and deferred loads. A front load is the initial sales charge defined as "a deduction made from each investment in the fund. The fee charged is generally based on the amount of the investment. Larger investments, both initial and cumulative, generally receive percentage discounts based on the dollar value invested.[40]" Similarly, a deferred load is a "back-end sales charge imposed when an investor redeems shares. The percentage charged generally declines the longer shares are held.[41]" Of all the 455 target retirement funds (includes all shares), 72 (15.8%) of the funds charge front loads and 85 (18.64%) of the funds charge deferred loads. After removing duplicate funds, or funds with shares based on certain fee minimums or other incentives, 117 funds

[40] Morningstar <http://search.morningstar.com/Glossary/>
[41] Ibid.

remained with 49 (41.88%) of the funds charging front loads and 0 funds charging deferred loads. These fees ranged from 3.00 – 5.75% of the investment, and were charged by 10 of the 20 families offering target retirement funds.

To analyze the difference in performance between load and no-load funds, the funds were separated into their respective categories and the total returns were compared over the 4 different investment horizons.

Table 6: Average Performance of Load and No-Load Funds

		2000 - 2014 LOAD	2000 - 2014 NO-LOAD	2015 - 2029 LOAD	2015 - 2029 NO-LOAD	2030+ LOAD	2030+ NO-LOAD
YTD	Observations	15	13	14	21	15	27
	Average Return	1.96%	3.03%	4.98%	4.23%	6.25%	5.66%
	Return σ	1.91%	1.09%	2.50%	0.90%	1.34%	0.64%
1 Year	Observations	11	12	8	20	9	24
	Average Return	3.46%	4.88%	5.46%	5.82%	7.01%	7.24%
	Return σ	1.38%	0.93%	1.20%	1.71%	0.90%	1.41%
3 Year	Observations	5	6	1	5	2	11
	Average Return	5.97%	10.99%	12.97%	15.11%	16.64%	18.33%
	Return σ	2.26%	3.12%		2.33%	1.74%	1.78%
5 Year	Observations	5	5	1	4	2	9
	Average Return	3.28%	5.24%	3.92%	6.08%	4.23%	6.69%
	Return σ	0.80%	1.37%		1.76%	0.14%	1.60%

As seen in Table 6, there was an almost even split between load and no-load funds for the 2000-2014 category, while there were nearly double the no-load funds compared to load funds for the 2015-2029 and 2030+ categories. This may be the result of fund families imposing load fees to prevent investors from actively trading in and out of the 2000-2014 category to keep assets as constant as possible before shareholders cash out for good. For the YTD returns, the load funds actually outperformed the no-load funds in the 2015-2029 and 2030+ categories. Over all other time horizons, no-load funds on average show superior performance compared to load funds. Interestingly, the average returns were higher, but the standard deviations for no-load funds were also higher for the 3 and 5 Year returns. This may due to the lack of load funds in this time horizon, but the 2000-2014 category has an equal split of load and no-load funds and

showed the same results. This shows investors must be more careful with no-load funds as their returns are spread over a wide range.

Before making an investment, investors should decide if they want to invest in a load or no-load fund, and if they decide on a load fund they must plan to minimize these charges by taking advantage of the large investment discount or long holding period if possible. By viewing the return history of existing funds, we can see that no-load funds, on average, have a superior performance to those of load funds. Importantly, however, this claim is based only on the preliminary data available. Since there were not a significant number of funds with a long history it is hard to find any predictable relationship between the returns enjoyed by load and no-load funds. In viewing the available data, however, no-load funds average return 1+% *over* the return of load funds. Since the target retirement funds are used for a long investment horizon, the difference in return per year can add up and lead to an appreciable difference for the no-load investor. A caveat of this, however, is there were a number of load funds with constant superior performance to those of no-load funds. For these funds, investors may be willing to pay a higher fee in order to obtain a higher return. Thus, this magnifies the difficulty an investor has in choosing a target fund as they must weigh the benefits and costs of the load fees and decide on what they feel confident in investing in.

Expense Ratio

Another key expense to look out for is the expense ratio or, "the percentage of a fund's assets paid for operating expenses and management fees, including 12b-1, administrative fees, and all other asset-based costs incurred by the fund, except brokerage costs. Sales charges are not included in the expense ratio. The expense ratio is useful because it shows the actual amount that

a fund takes out of its assets each year to cover its expenses.[42]" For the most part, target retirement funds in different categories had similar expense ratios within the same families. These expense ratios ranged from 0.21% charged by Vanguard funds to 1.65% charged by SunAmerica funds. The comparative 10 year costs of these funds per $10,000 are $255 and $2,417, respectively. Effectively, the SunAmerica funds cost over 9 times that of the Vanguard funds, and unless they generate returns over 9 times that of the Vanguard funds, this will eat into the returns enjoyed by the investor. The average expense ratio of all funds was 1.01%, with a nearly equal split of funds below and above this number, as seen in Table 7.

Table 7: Breakdown of Target Retirement Fund Expense Ratios

Expense Ratios	Obs
X ≤ .50 %	7
.50 < X ≤ .75%	18
.75 < X ≤ 1.00%	33
1.00 < X ≤ 1.25%	36
1.25 < X ≤ 1.50%	17
X > 1.50%	6

To get an idea of the impact of expense ratios, consider a hypothetical investment of $100,000 invested over 40 years, with a 9.51% annual return (average return for a balanced fund from 1966–2005). Using Vanguard's cost calculator, Table 8 shows the results for the largest 3 funds (by assets) in the 2030+ category. Assuming the funds generate the same returns, between Fidelity's 0.79% and Vanguards 0.21% expense ratio the difference in ending value is $723,852. Similarly, between Fidelity's 0.79% and T. Rowe Price's 0.84% expense ratio the difference in ending value is $55,023. Fidelity and T. Rowe's funds would have to generate a 0.64% and 0.70% higher return per year, to match Vanguard and compensate for the difference in expense ratio. Considering that nearly half of the target retirement funds in the sample have expense

[42] Morningstar <http://search.morningstar.com/Glossary/>

ratios greater than 1.00%, the costs of other funds can be over 5 times larger than that charged by Vanguard. Investors must therefore analyze fund returns and determine if a fund with a high expense ratio generates a substantially larger return to compensate for the fees it charges.

Table 8: Expense Ratio Costs Example

	Vanguard Target Retirement 2045 Fund	Fidelity Freedom 2040 Fund	T. Rowe Price Retirement 2040 Fund
Expense Ratio	0.21%	0.79%	0.84%
Investment Value	$3,785,743	$3,785,743	$3,785,743
Total Cost	($305,320)	($1,029,173)	($1,084,200)
Value After Costs	**$3,480,423**	**$2,756,571**	**$2,701,543**

A general guide for expense ratios is to choose funds with a ratio of 1.00% or less. Accordingly, the target funds were separated by their respective categories and into two groups: funds with an expense ratio of 1.00% or less and funds with an expense ratio of greater than 1.00%. To analyze the impact of expense ratios, the performance and volatility of these two groups were analyzed over the 4 time horizons.

Table 10: Performance of Funds with Expense Ratios ≤1.00% vs >1.00%

		2000 - 2014 ≤ 1.00%	2000 - 2014 > 1.00%	2015 - 2029 ≤ 1.00%	2015 - 2029 > 1.00%	2030+ ≤ 1.00%	2030+ > 1.00%
YTD	**Observations**	13	15	16	19	21	21
	Average Return	2.97%	2.02%	4.39%	4.66%	5.74%	6.00%
	Return σ	1.07%	1.94%	0.92%	2.22%	0.65%	1.22%
1 Year	**Observations**	12	11	15	13	18	15
	Average Return	4.89%	3.15%	5.80%	5.62%	7.07%	7.30%
	Return σ	0.93%	1.37%	1.91%	1.11%	1.55%	0.90%
3 Year	**Observations**	5	6	4	2	9	4
	Average Return	10.70%	7.05%	15.17%	13.93%	18.41%	17.31%
	Return σ	3.40%	3.33%	2.69%	1.35%	1.95%	1.36%
5 Year	**Observations**	4	6	3	2	7	4
	Average Return	4.70%	3.96%	5.32%	6.14%	6.15%	6.41%
	Return σ	0.74%	1.83%	1.08%	3.14%	1.36%	2.52%

The results were surprising. 2000-2014 was the only category to show funds with an expense ratio ≤ 1.00% performing better on average than funds with an expense ratio >1.00%. There was no discernible pattern in the other two categories, as the funds behaved differently

over different time horizons. This may be the result of the higher expense ratio funds having some management ability that allows them to perform better over time, justifying the higher cost. From the data, there was also no pattern regarding the return standard deviation.

To confirm these observations, the correlations between returns and expense ratios were calculated in Table 11. As expected, only the 2000-2014 category showed a significant negative relationship between expense ratios and returns. While it was not unanimous, a possible negative correlation is observed, showing that as expense ratios increase, returns decrease.

Table 11: Expense Ratio and Return Correlations

	2000 - 2014	2015 - 2029	2030+
YTD	-0.08	0.02	0.12
1 Year	-0.48	-0.08	0.18
3 Year	-0.31	-0.24	-0.27
5 Year	-0.25	0.57	-0.30

To further analyze this relationship, the expense ratios were analyzed again except instead of using returns, returns less the expense ratio was used. The goal of this exercise was to see if a relationship existed between expense ratio and the returns an investor could expect to see. The same time horizons were used as in the previous example.

Table 12: Adjusted Performance of Funds with Expense Ratios ≤1.00% vs >1.00%

		2000 - 2014 ≤ 1.00%	2000 - 2014 > 1.00%	2015 - 2029 ≤ 1.00%	2015 - 2029 > 1.00%	2030+ ≤ 1.00%	2030+ > 1.00%
YTD	**Observations**	13	15	16	19	21	21
	Average Adjusted Return	2.21%	0.82%	3.63%	3.30%	4.98%	4.73%
	Adjusted Return σ	1.00%	1.92%	0.84%	2.30%	0.65%	1.24%
1 Year	**Observations**	12	11	15	13	18	15
	Average Adjusted Return	4.15%	1.90%	5.05%	4.24%	6.33%	6.04%
	Adjusted Return σ	0.92%	1.41%	1.92%	1.21%	1.49%	0.95%
3 Year	**Observations**	5	6	4	2	9	4
	Average Adjusted Return	9.93%	5.93%	14.33%	12.34%	17.59%	16.06%
	Adjusted Return σ	3.39%	3.28%	2.76%	0.90%	1.96%	1.38%
5 Year	**Observations**	4	6	3	2	7	4
	Average Adjusted Return	3.92%	2.84%	4.46%	4.55%	5.32%	5.17%
	Adjusted Return σ	0.79%	1.84%	1.19%	2.69%	1.52%	2.55%

The results of this exercise were more in line with expectations. With the exception of the 5 Year returns for the 2015-2029 category, the funds with an expense ratio ≤ 1.00% outperformed funds with an expense ratio > 1.00%. To confirm this relationship, the correlation between the expense ratio and the adjusted returns were calculated as in Table 13. The results were strongly suggestive of the negative relationship between expense ratio and returns. Only the 5 Year horizon for the 2015-2029 correlation was positive. In all other categorical periods by using the adjusted returns, the relationships were turned negative or the negative relationship was strengthened.

Table 13: Expense Ratio and Adjusted Return Correlation

	2000 - 2014	2015 - 2029	2030+
YTD	-0.25	-0.21	-0.20
1 Year	-0.63	-0.33	-0.09
3 Year	-0.36	-0.41	-0.38
5 Year	-0.38	0.35	-0.42

From these correlations, we can see there is a negative relationship between expense ratios and adjusted returns. Since the correlations are not all significant, this shows that expense ratios are only one of the factors affecting returns. Although past performance is no indicator of future results, we can say investors, on average, would be better off by choosing a target retirement fund with a lower expense ratio. There are exceptions to this rule, however, as not all funds with low expense ratios have decent returns and not all funds with high expense ratios have poor returns relative to their peers.

One of the possible reasons for the large differences in the expense ratio could be the annual asset turnover. The turnover ratio is "a measure of the fund's trading activity, which is computed by taking the lesser of purchases or sales and dividing by average monthly net assets. In practical terms, the resulting percentage loosely represents the percentage of the portfolio's

holdings that have changed over the past year.[43]" Funds with higher turnover ratios are engaged in heavy buying and selling to shift portfolio assets, which could cause higher transaction costs or more management involvement leading to higher expense ratios. Funds with lower turnover ratios, on the other hand, are involved in buy and hold strategies of passive investing leading to lower expense ratios. As seen in Table 14, of the 94 funds with history of at least one year, most of the target retirement funds are passive portfolios with over 80% changing less than a quarter of their assets a year. While most of these funds are passive portfolios, a handful of funds are more actively managed, with all of the Wells Fargo Advantage Outlook funds averaging a 64.80% turnover ratio.

Table 14: Breakdown of Target Retirement Funds Annual Asset Turnover

Annual Turnover	Obs
X ≤ 5%	36
5% < X ≤ 15%	25
15% < X ≤ 25%	15
25% < X ≤ 35%	8
X > 35%	9

Importantly, however, expense ratios can be changed. Small funds often have higher expense ratios as their expenses are paid out from a limited asset pool. In the dataset, the top 10 funds with the highest expense ratios, including smaller fund families like AllianceBernstein, have an average expense ratio of 1.17% and average total assets of $2 million. Conversely, the top 10 funds with the lowest expense ratios, including larger fund families like Vanguard and Fidelity, have an average expense ratio of 0.57% and average total assets of $4.915 billion. As the small funds become larger, therefore, their expense ratios may shrink as more investors are paying the fees. Additionally, expenses can change based on policy decisions of the firm. Fidelity previously charged an expense ratio that equaled the average of its underlying funds,

[43] Morningstar <http://search.morningstar.com/Glossary/>

like competitors Vanguard and Fidelity, plus an additional .08% management fee on top. As of May 1, 2005, however, caving towards popular demands for lower expense ratios, Fidelity announced it would no longer charge the additional fee[44]. While fees are on a downward trend, investors should continually monitor the expense ratio of the fund they choose because there can also be adverse changes that may increase fees which reduce their returns.

Performance

Apart from deciding the characteristics of their portfolio, the other important thing investors should care about in their investments is the returns. While the main attraction of the target retirement funds may be the rebalancing and diversification aspects, investors need to consider performance, as rebalancing and diversification become irrelevant if the performance of the funds is inferior to other products on the market. While the past does not necessarily dictate what will happen in the future, past performance is one of very few indicators that will lead to hints about the future.

Raw Returns

Due to differences in strategy, the returns across different categories should be very different. The 2000-2014 returns should be less than 2015-2029 returns which in turn should be less the 2030+ returns, due to the different concentrations of stocks. Basic summary statistics were calculated by averaging the total returns of all funds within each category over the four different time horizons. Table 15 shows returns vary greatly across category but do follow the expected pattern with the categories having higher stocks also having higher returns.

[44] Morningstar <http://advisor.morningstar.com/articles/doc.asp?docId=4065>

Table 15: Performance Breakdown by Category

		2000 - 2014	2015 - 2029	2030+
YTD	Average Return	2.46%	4.53%	5.87%
	Return σ	1.64%	1.73%	0.98%
	Median Return	2.85%	4.55%	5.75%
	Minimum	-0.88%	0.99%	3.65%
	Maximum	5.11%	9.94%	8.66%
1 Year	Average Return	4.05%	5.72%	7.18%
	Return σ	1.45%	1.57%	1.28%
	Median Return	4.20%	5.95%	7.50%
	Minimum	0.60%	0.72%	4.80%
	Maximum	6.30%	8.20%	9.10%
3 Year	Average Return	8.71%	14.75%	18.07%
	Return σ	3.71%	2.26%	1.81%
	Median Return	9.46%	14.32%	18.12%
	Minimum	4.26%	12.39%	15.41%
	Maximum	15.81%	18.52%	20.98%
5 Year	Average Return	4.26%	5.65%	6.24%
	Return σ	1.48%	1.80%	1.74%
	Median Return	3.95%	5.81%	6.12%
	Minimum	1.92%	3.92%	4.13%
	Maximum	7.40%	8.36%	8.82%

In analyzing these returns, some interesting trends are observable. The average return standard deviation generally was greater for the 2000-2014 and 2015-2029 categories compared to the 2030+ category. Presumably, this occurred because the first two categories have the widest range in their asset allocations. Whereas most of the funds in the 2030+ category had stock allocations between 60-100%, the range of the other two categories spanned between 0-80%. Importantly, across all categories and time horizons, results may have been skewed with noisy data as smaller fund outliers could have affected the numbers. As more historical performance becomes available, future studies may therefore want to filter funds based on fund size or history to remove this noise. This phenomenon was also noticeable in the wide range between the minimum and maximum returns achieved by the funds.

Differential Returns

Before investing, naïve investors may care about differential returns, or the raw performance of their fund over that of an index. They would make their investing decisions based on whether or not the fund they were investing in under/over performed against a comparable index. One of the biggest difficulties in judging base-line performance for target retirement funds occurs because of the changing portfolio allocations. It is nearly impossible for one index to track the changing allocations, so one index may not best represent the different categories over each of the different time periods. For this study, for simplicity the Dow Jones Moderate Portfolio Index was used to compute differential returns found in Table 16. The Dow Jones index was chosen since it mimics the *average* portfolio allocations over the life of the target funds. Further studies may wish to use multiple indexes to better capture differential performance.

Table 16: Differential Performance Breakdown by Category

		2000 - 2014	2015 - 2029	2030+
YTD	Average Differential Return	-1.68%	0.39%	1.73%
	Differential Return σ	1.64%	1.73%	0.98%
	Median Differential Return	-1.30%	0.41%	1.61%
	Minimum	-5.02%	-3.15%	-0.49%
	Maximum	0.97%	5.80%	4.52%
1 Year	Average Differential Return	-2.88%	-1.21%	0.25%
	Differential Return σ	1.45%	1.57%	1.28%
	Median Differential Return	-2.73%	-0.98%	0.57%
	Minimum	-6.33%	-6.21%	-2.13%
	Maximum	-0.63%	1.27%	2.17%
3 Year	Average Differential Return	-7.66%	-1.62%	1.70%
	Differential Return σ	3.71%	2.26%	1.81%
	Median Differential Return	-6.91%	-2.06%	1.75%
	Minimum	-12.11%	-3.98%	-0.96%
	Maximum	-0.56%	2.15%	4.61%
5 Year	Average Differential Return	-3.74%	-2.35%	-1.76%
	Differential Return σ	1.48%	1.80%	1.74%
	Median Differential Return	-4.06%	-2.19%	-1.88%
	Minimum	-6.08%	-4.08%	-3.87%
	Maximum	-0.60%	0.36%	0.82%

Trends similar to those found in the raw returns were found in the differential returns. Over each time horizon, the category with the higher allocation of stocks performed better. The problem of noise in the data remained, with wide ranges between the minimum and maximum returns. Since the Dow Jones Moderate Portfolio Index has similar allocations to that of the 2015-2029 category, as expected the 2000-2014 category had negative differential returns. Curiously, however, over the 1, 3, and 5 Year horizons, the 2015-2029 category also had negative differential returns. Similarly, the 2030+ category had negative differential returns over the 5 Year horizon. To better investigate this, the number funds with positive or negative differential returns were analyzed.

Table 17: +/- Differential Return Observations by Category

		2000 - 2014	2015 - 2029	2030+
YTD	+ Differential Return	4	20	41
	- Differential Return	24	14	1
1 Year	+ Differential Return	0	7	22
	- Differential Return	23	21	11
3 Year	+ Differential Return	0	1	10
	- Differential Return	11	5	3
5 Year	+ Differential Return	0	1	3
	- Differential Return	10	4	8

As seen in Table 17, with the exception of the YTD returns, no fund in the 2000-2014 category had a positive differential return. For the 2015-2029 category, there were funds with positive differential returns over each time horizon, but only in YTD returns were there more funds with positive differential returns than negative differential returns. Lastly, for the 2030+ category, with the exception of the 5 Year time horizon, the number of funds with positive differential returns more than doubled those with negative differential returns. While no

conclusive statement can be made about these results, it is surprising that so few of the 2015-2029 funds had positive differential returns, especially since the Dow Jones Moderate Portfolio Index most closely resembles this category. It would seem that the Target Date 2030+ category would be the only worthwhile investment, but simply looking at differential returns may not provide the whole picture.

Risk-Adjusted Returns

Sophisticated investors should be cared about the differential returns explained above, but they would adjust these returns for risk. To determine the risk adjusted returns, the alpha is determined using the following formula:

$$R_i - R_f = \alpha_i + \beta_i(R_m - R_f) + e_i$$

Where:

R_i = monthly return on mutual fund *i*
R_f = return on 30 day T-bill
R_m = return of the Dow Jones Moderate Portfolio Index
β_i = sensitivity of the fund I to return of index
α_i = risk adjusted return of fund *i*

Using the inputs described above, the risk adjusted returns of the funds were calculated. Given that most fund β's were only available for funds with a history of at least 3 years, only the 3 and 5 Year horizons were looked at for this study.

Table 18: Risk-Adjusted Performance Breakdown by Category

		2000 - 2014	2015 - 2029	2030+
3 Year	Average α	-2.22%	-1.33%	-1.34%
	Median α	-1.78%	-1.34%	-1.27%
	Minimum α	-3.96%	-2.40%	-2.48%
	Maximum α	-0.13%	-0.35%	-0.15%
	Average β	0.61	0.92	1.12
	Average R^2	69.27	94.50	93.00
5 Year	Average α	-1.64%	-4.17%	-5.82%
	Median α	-1.76%	-4.11%	-5.88%
	Minimum α	-3.49%	-4.79%	-7.01%
	Maximum α	0.32%	-3.66%	-4.79%
	Average β	0.50	1.04	1.35
	Average R^2	61.56	92.75	92.88

As seen in Table 18, the average risk-adjusted returns for each category over every time horizon were negative. A possible explanation for the negative results may be the choice of index, but both the 2015-2029 and 2030+ categories had a R^2 higher than 90%, indicating a good fit. The index may not have been the best fit for the 2000-2014 category, which had a relatively low R^2 of about 60%. There was a wide range of α for each category, but the maximum α does show that some funds do perform almost as well as the index. To get a better idea of how well the funds did the number of funds with positive or negative α were determined.

Table 19: +/- α Observations by Category

		2000 - 2014	2015 - 2029	2030+
3 Year	+ α	0	0	0
	- α	11	6	13
5 Year	+ α	2	0	0
	- α	8	4	7

Rather distressingly, all but 2 funds in the 5 Year time horizon had negative alphas, suggesting that most all target retirement funds are inferior to the index. But by looking further at the funds, we can see there are some funds that come close to performing as well as the index. The DWS Target 2010 and 2011 were the only two funds to outperform the index in the 5 year

horizon. The other standouts were the Principal Investors and T. Rowe Price Funds which had α ranging from -0.13% to -0.80% across all categories for the 3 Year time horizon (they did not have a 5 Year history). Thus, using risk-adjusted returns does show that the performance of some funds does warrant the investment into a target retirement fund, but very few of these exist in the entire population.

Performance Wrap-Up

Viewing the raw, differential, and risk-adjusted performance of target retirement funds shows that investors may want to think twice before investing in target retirement funds. Across the different return measurements, a majority of the funds had returns inferior to the index although there were some funds that held their own against the index. Curiously, despite this poor performance, target retirement funds have enjoyed incredible popularity over the past few years. One explanation would be that investors are willing to sacrifice higher returns for the peace of mind that these funds provide. They are most likely not concerned with optimal portfolio maximization, but an easier way to invest while providing decent returns. Gruber (1999) also notes the existence of different types of investors, which can explain this phenomenon. He notes the existence of unsophisticated investors who are easily influenced by brokers or advertising, disadvantaged investors who are restricted by their pension accounts, and tax disadvantaged investors where it would be inefficient to remove their money[45].

Importantly, however, the lack of historical data prevents any definitive conclusions from being drawn about the returns of target retirement funds compared to this index. Since these target retirement funds are meant for investing in a long time horizon, at least over 10 years, few of the funds had histories this long, making it impossible to see how investors would fare in the

[45] Gruber, Martin J. "Another Puzzle: the Growth in Actively Managed Mutual Funds."

long term. Noticeably, for example, the Vanguard offerings were omitted from the risk-adjusted return sample because it lacked a history of at least 3 years. As more data becomes available and as companies refine their formulas for these funds, we may find target retirement funds perform better than or as well as the index. Consequently, a future study may wish to revisit the performance of target retirement funds and see if these preliminary results hold up.

Conclusion

Target retirement funds are a welcome addition for many investors as they bring a new degree of simplification and automation to the investing process. They are marketed as being so simple that the investor only needs to decide on their retirement date before investing, but this paper finds that the decision process requires much more effort. By analyzing offerings across different fund families, major disparities quickly become apparent in the asset allocation decisions, the automation process, and the fees charged to investors. Upon closer inspection, we find these small differences can have a significant impact on returns and ultimately the ending portfolio value. While the asset allocation decisions and the automation process should be tailored to the preference of each individual, in regards to fees investors purchasing funds with no-loads and expense ratios $\leq 1.00\%$, on average, enjoy much higher returns than funds with loads and expense ratios $>1.00\%$. So while investors can easily invest in the target retirement fund offered by their company or by a mutual fund company they are familiar with, to really find a fund that suits their risk tolerance and future goals they must to the requisite research and compare options before investing.

To try and determine whether target retirement funds are worthwhile investments, the raw, differential, and risk-adjusted returns of these funds were compared to the Dow Jones Moderate Portfolio Index. The overwhelming majority of the funds in our sample had negative

differential returns and negative risk-adjusted returns. Since only a handful of funds outperformed or even matched the index, this begs the question of why investors would invest in target retirement funds at all. Due to incredible investor demand for these funds, we can only assume that the unquantifiable peace of mind these funds offer outweighs demand for a more "optimal" fund that could provide higher returns. Future studies may want to analyze what intangible benefits these target retirement funds have that causes investors to favor these funds.

Importantly, due to the newness of these funds we are not able to make more concrete claims or predict the future performance of these funds. The amount of data available was extremely limited, as many of the funds analyzed had histories of only a year or less. Even with the data available, relying on past performance is difficult as companies are still refining their formulas and methodologies. For example, in the past year Vanguard and Fidelity announced significant changes to their equity and foreign stock allocations, which will undoubtedly impact the future performance of the funds. As more data becomes available and after the companies are finished fine-tuning their methods, a future study may want to revisit the analysis of these funds to draw new conclusions and to see if these preliminary observations remain true.

The merits of target retirement funds aside, we find the marketing of these funds to be particularly troublesome. Mutual fund literature describes these funds as "hands-off investing[46]" that "is always appropriate[47]" and advocates "sometimes the best way to manage your retirement fund is to ignore it[48]." While these funds do bring simplicity and peace of mind for investors, those strong claims may provide investors with a false sense of security and unrealistic expectations for their retirement. Furthermore, these claims encourage the investor to neglect their portfolio which is dangerous since target retirement funds are aimed at young or

[46] Vanguard <http://www.vanguard.com/jumppage/retire/>
[47] Fidelity <http://personal.fidelity.com/products/funds/content/freedomfunds.shtml.cvsr>
[48] Vanguard <http://www.vanguard.com/jumppage/retire/>

inexperienced investors. By not monitoring their portfolios, investors may be in for a rude awakening when they reach retirement and find their investment is not worth nearly enough as they had hoped. By not fully educating investors and not getting them interested in taking hold of their own financial futures, this can generate huge future problems for the industry as they will have to deal with many disgruntled customers.

There were also some other issues about target retirement funds that were identified but not explored in this study. First, age is the overriding factor for investing in one of these funds and it basically it is the only thing target retirement investors have in common. From that standpoint, it is hard to believe that one fund is appropriate for millions of investors with different financial needs, different lifestyles, different risk tolerance, etc. As a result, a future study may wish to analyze how the target retirement funds perform across different socioeconomic classes. Next, these funds are supposed to be *the one* investment for retirement. In today's day and age, it is hard to believe that investors will solely have a target retirement fund. Many investors own company stock, have an appreciable amount of cash saved in their local bank, have a pension or 401(k) plan, and can reasonably expect Social Security. Thus, a future study may wish to investigate if and how outside investments impact the allocation formulas of target retirement funds and what that means for in the end for the investor.

Moving on, we believe although target retirement funds are not perfect, they are a step in the right direction. They attempt to make investing more approachable for the average investor and provide them with a sense of security that their retirement savings are being monitored and altered as they age. Consequently, these funds seem to be the most beneficial for new or inexperienced investors and those without the time or desire to monitor and reallocate their retirement portfolios. As these funds become refined, we believe along with picking a target

year investors should be able to specify their risk tolerance. Since investors have different retirement expectations, a risk tolerance option would control for how aggressive the asset allocations are throughout the lifetime and when and how rebalancing occurs. More disclosure about the process should also be available, so the investor can make an informed choice and have an idea about how their risk decision would affect their portfolio compared to the other options.

Lastly, there is no simple answer for how to best save for retirement. Inevitably, just as one-size-fits-all options end up fitting some better than others, target retirement funds will not be able to meet the needs of every investor. To get a fully customized retirement portfolio, an investor may be better off seeking the help of a financial advisor. A personal advisor may be able to better inform the investor of the ramifications of their decisions and better prepare a portfolio that captures all the needs of the investor. In the end, retirement is just too important to ignore and investors should seek out and explore every option to find what best suits there needs and will achieve their retirement goals.

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