Target Date Asset Allocation Methodology
Total Wealth Allocation Approach

WHITEPAPER

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1. EXECUTIVE SUMMARY

Merrill Lynch Global Wealth Management (GWM) provides financial advice and investment solutions to individuals, businesses, governments and institutions. As a leader in the retirement business, we work with millions of individual investors and integrated benefit participants to assist them in achieving retirement and financial success. With our experience, we have developed an innovative approach to target date or "life cycle" investing.

A Target Date Portfolio is a long-term investment for an individual with a specific retirement date in mind. As the target date approaches, the portfolio gradually shifts the investor's holdings toward lower-risk investments. The Merrill Lynch Target Date Asset Allocation Model methodology considers the total wealth of an individual over time, and is therefore uniquely designed to meet the holistic needs of our clients. The Target Date Asset Allocation Model is distinguished by its consideration of not only financial wealth, but also real estate wealth and human capital, key drivers of total wealth. The model incorporates the purchase and ongoing ownership of real estate wealth at a specified age within the glide path, and applies human capital as an individual asset class with risk/return properties, and correlations to more traditional asset classes. The Model is sensitive to varying assumptions regarding risk tolerance, affluence, retirement age, real estate purchase age, income, and savings rate over time.

It is important that participants are aware of the advantages and disadvantages of using the Target Date Asset Allocation approach. The advantages include having a simple source for gaining access to a diversified portfolio that is actively rebalanced over time, shifting from aggressive to conservative allocations as the participant approaches retirement. The disadvantage of the approach is that it cannot be customized to suit every investor's individual situation. For more details regarding the risks associated with target date portfolios refer to section 4 (vi) page 9.

This document outlines the principles and methodology used by Merrill Lynch Wealth Management to develop its Target Date Asset Allocation Model, as well as its key results. It also specifies how the model provides guidance to plan sponsors within the GoalManager® Portfolio Rebalancing Service using Target Date Portfolio Models.

SUMMARY

The Merrill Lynch Target Date Asset Allocation Model methodology considers the total wealth of an individual over time, and is therefore uniquely designed to meet the holistic needs of our clients.

This document outlines the principles and methodology used by Merrill Lynch Wealth Management to develop its Target Date Asset Allocation Model, as well as its key results.

The changes to the Target Date Asset Allocation models include a two-percentage point reduction in equity allocations in the 2015, 2020, 2025 and 2030 portfolios.

This retirement model is developed based on the idea that the primary concern of retirees is not outliving their wealth.

GoalManager using target date portfolios is a custom solution designed to support gradual shifts in the asset allocation models to become more conservative, as the target date approaches. The target date in the GoalManager portfolio models represents the approximate date an investor may plan to withdraw assets from his/her retirement account. The principal value of a target date portfolio is not guaranteed at any time, including at the target date.

TABLE OF CONTENTS

2. TARGET DATE ASSET ALLOCATIONS

i. What is a target date portfolio?

A Target Date Portfolio is designed to be a long-term investment for an individual with a specific retirement date in mind. For example, a 2030 Target Date Portfolio is constructed to accommodate the investment needs of someone planning to retire in that year. Target Date Portfolios make it easier to invest for retirement by automatically rebalancing portfolio weights and gradually shifting an investor's asset allocation toward lower-risk investments as the target retirement date approaches.

Although constructed according to portfolio management best practices, Target Date Portfolios entail risk. The portfolios have material exposure to equities, even once the target retirement date is reached. The Merrill Lynch GWM 2015 target date portfolio, for example, has a 46% allocation to stocks. This is because someone retiring in 2015 has a substantial chance of living another two or three decades and therefore still has a relatively long time horizon. However, it is important to note that our methodology will only shift an investor's asset allocation toward lower risk investments up to their retirement date. So while a 46% allocation to stocks may be appropriate for someone at their retirement date, we believe investors entering retirement should re-evaluate their investment strategy in the context of a broader financial plan. For further detailed discussion regarding options available to investors once a target date has been reached refer to section 5 (i) page 10.

Target date portfolios, even if they share the same target date, may have very different investment strategies and risks. They do not guarantee that you will have sufficient retirement income at the target date, and you can lose money, including at or after the target date. Target date portfolios do not eliminate the need for you to decide, before investing and from time to time thereafter, whether the fund fits your risk tolerance, personal circumstances, and complete financial situation. As a result, investors should not solely rely on their age or retirement date when selecting a target date portfolio.

ii. Target date asset allocation models

The Target Date Asset Allocation Models are shown in Tables 1 and 2. Table 1 is intended for use by plans with standard or core investment asset classes. Table 2 is intended for use by plans with both core and additional sub-asset classes.

As a result of the Merrill Lynch (GWM) Investment Management & Guidance Group annual review process, the allocations have marginally changed from the Target Date Asset Allocation models provided last year (see appendix i). Specifically, the changes have resulted in a two-percentage point reduction in equity allocations in the 2015, 2020, 2025 and 2030 portfolios. The retirement model is based on the idea that the primary concern of retirees is not outliving their wealth (see, page 10).

Table 1: Target Date Asset Allocation Models (Set I)

Asset Class	Target Date Asset Allocation Models (Set I)									
	Retirement	2015	2020	2025	2030	2035	2040	2045	2050	2055
Large Cap Value	10%	11%	14%	17%	19%	22%	22%	23%	23%	23%
Large Cap Growth	10%	11%	14%	17%	19%	22%	22%	23%	23%	23%
Mid Cap Value	3%	3%	4%	5%	6%	6%	7%	7%	7%	7%
Mid Cap Growth	3%	3%	4%	5%	6%	6%	7%	7%	7%	7%
Small Cap Value	1%	2%	2%	2%	3%	3%	3%	3%	3%	3%
Small Cap Growth	1%	2%	2%	2%	3%	3%	3%	3%	3%	3%
International Developed	10%	12%	16%	18%	20%	22%	24%	24%	24%	24%
Emerging Markets	2%	2%	2%	4%	4%	4%	4%	5%	5%	5%
Intermediate Fixed Income	55%	49%	37%	25%	15%	7%	3%	-	-	-
Money Market/Stable Value	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Percent Equity	40%	46%	58%	70%	80%	88%	92%	95%	95%	95%
Percent Fixed Income	60%	54%	42%	30%	20%	12%	8%	5%	5%	5%
Expected Arith. Avg. Return (Annl.)*	7.1%	7.4%	7.9%	8.5%	9.0%	9.3%	9.5%	9.7%	9.7%	9.7%
Expected Geo. Avg. Return (Annl.)*	6.8%	7.0%	7.4%	7.8%	8.0%	8.2%	8.3%	8.4%	8.4%	8.4%
Expected Volatility (Annl.)*	8.3%	9.1%	10.8%	12.8%	14.5%	15.7%	16.4%	17.0%	17.0%	17.0%

Please note that Investment Management & Guidance group may modify the intended percentage allocations of a target date portfolio.

* Expected Risk & Return based on Merrill Lynch Global Wealth Management Capital Market Assumptions 2013.

Note: Models as of January 2014

Table 2 provides the Target Date Asset Allocation Models (Set II) for a more granular depiction of the model's style allocation, including specific percentages associated with international and fixed income concentrations.

Table 2: Target Date Asset Allocation Models (Set II)

Asset Class	Target Date Asset Allocation Models (Set II)									
	Retirement	2015	2020	2025	2030	2035	2040	2045	2050	2055
Large Cap Value	10%	11%	14%	17%	19%	22%	22%	23%	23%	23%
Large Cap Growth	10%	11%	14%	17%	19%	22%	22%	23%	23%	23%
Mid Cap Value	3%	3%	4%	5%	6%	6%	7%	7%	7%	7%
Mid Cap Growth	3%	3%	4%	5%	6%	6%	7%	7%	7%	7%
Small Cap Value	1%	2%	2%	2%	3%	3%	3%	3%	3%	3%
Small Cap Growth	1%	2%	2%	2%	3%	3%	3%	3%	3%	3%
International Value	5%	6%	8%	9%	10%	11%	12%	12%	12%	12%
International Growth	5%	6%	8%	9%	10%	11%	12%	12%	12%	12%
Emerging Markets	2%	2%	2%	4%	4%	4%	4%	5%	5%	5%
Interm. FI Corporate	11%	10%	9%	6%	3%	1%	1%	-	-	-
Interm. FI Government	24%	22%	15%	11%	7%	2%	2%	-	-	-
Interm. FI Mortgage	12%	11%	9%	6%	3%	2%	-	-	-	-
High Yield	4%	3%	2%	1%	1%	1%	-	-	-	-
TIPS	4%	3%	2%	1%	1%	1%	-	-	-	-
Money Market/Stable Value	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Percent Equity	40%	46%	58%	70%	80%	88%	92%	95%	95%	95%
Percent Fixed Income	60%	54%	42%	30%	20%	12%	8%	5%	5%	5%
Expected Arith. Avg. Return (Annl.)*	7.0%	7.3%	7.9%	8.5%	8.9%	9.3%	9.5%	9.7%	9.7%	9.7%
Expected Geo. Avg. Return (Annl.)*	6.7%	6.9%	7.3%	7.7%	8.0%	8.2%	8.3%	8.4%	8.4%	8.4%
Expected Volatility (Annl.)*	8.3%	9.2%	10.9%	12.8%	14.5%	15.7%	16.3%	16.9%	16.9%	16.9%

Please note that Investment Management & Guidance group may modify the intended percentage allocations of a target date portfolio.

* Expected Risk & Return based on Merrill Lynch Global Wealth Management Capital Market Assumptions 2013.

Note: Models as of January 2014

iii. Target date model assumptions

The table below provides the model assumptions used to develop the Target Date Asset Allocation Models available for use as guidance within the GoalManager® Portfolio Rebalancing Service.

These assumptions are consistent with an average moderate investor. Section 4 details the assumptions outlined within the chart below, and specifies the relationship between the Target Date Model Assumptions and the Target Date Asset Allocation Methodology.

Table 3: Target Date Model Assumptions

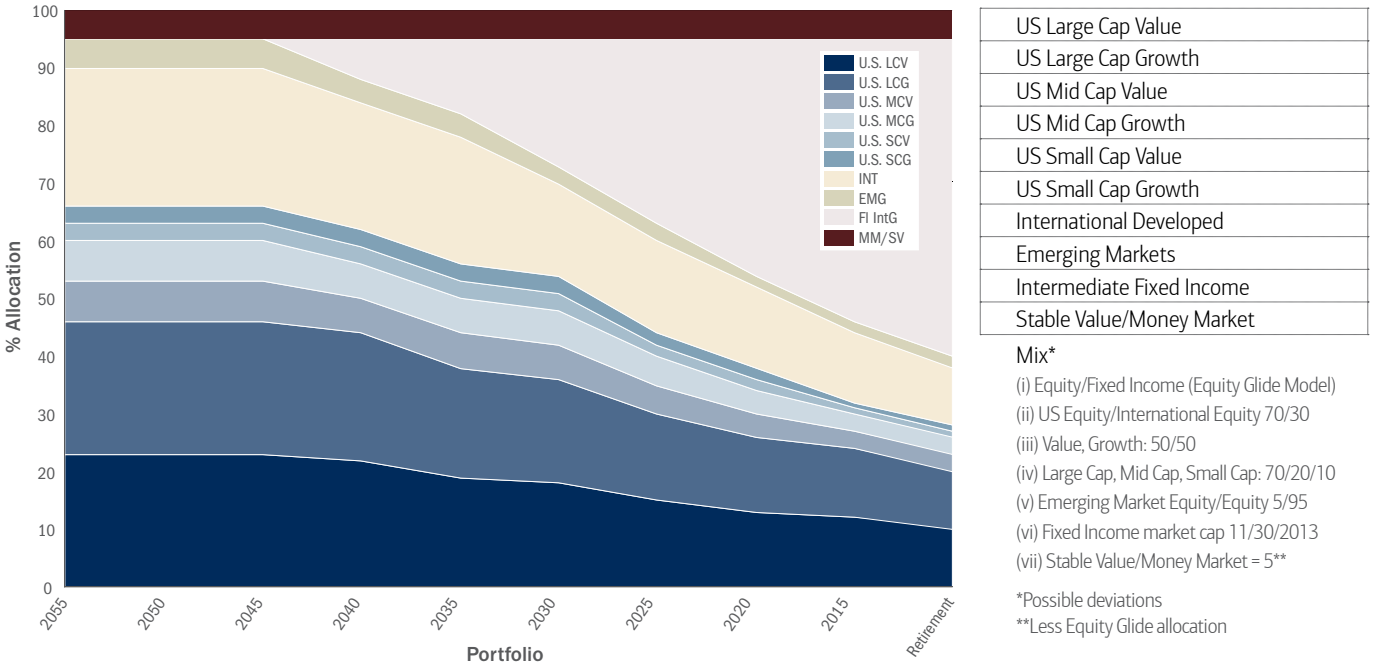
Target Date Model Assumptions	
Parameter	**Model Assumption/Input**
Risk Aversion	Moderate
Inflation	2.5%
Risk-Free Rate	3.0%
Savings Rate	7%
Discount factor in Human Capital	6.5%
Average Investor Income*	Based on industry survey values for average investors
Starting Age	Age 25
Retirement Age	Age 65
Period Real Estate Purchase	Age 35
Shift in Assets from Financial Wealth to Real Estate Wealth	70%
Savings Growth Rate	0.1%

* Average Investor Income Assumptions are detailed in Section 4.

iv. Target date glide path representation

Figure 1 depicts the Target Date Asset Allocation Glide Path for an "Average Moderate Investor," showing how the allocations will change as retirement nears.

Figure 1: Target Date Asset Allocation Glide Path



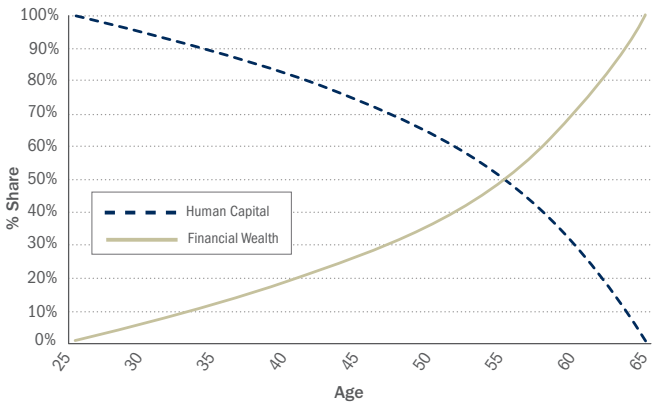
3. WEALTH AND ASSET ALLOCATION

i. Total wealth and human capital

An investor's total wealth typically consists of two parts: traditional financial assets (stocks, bonds and cash) and human capital. Human capital is defined as the economic present value of an investor's future labor income. Empirical studies have found that for the majority of U.S. households, human capital is the dominant asset and traditional financial assets represent a smaller proportion of total wealth (Lee and Hanna, 1995).

Typically, a a younger investor's total wealth is dominated by the value of her human capital. With many years ahead before retirement and few years behind for saving to fund traditional financial assets, human capital dominates. Conversely, an older investor's total wealth tends to have more financial capital than human capital as a result of fewer years to retirement but many more years of funding traditional financial assets. A stylized illustration of the relationship between human capital and financial wealth over an investor's working years is shown in Figure 2.

Figure 2: Expected Financial Capital and Human Capital over the Working-Life Cycle

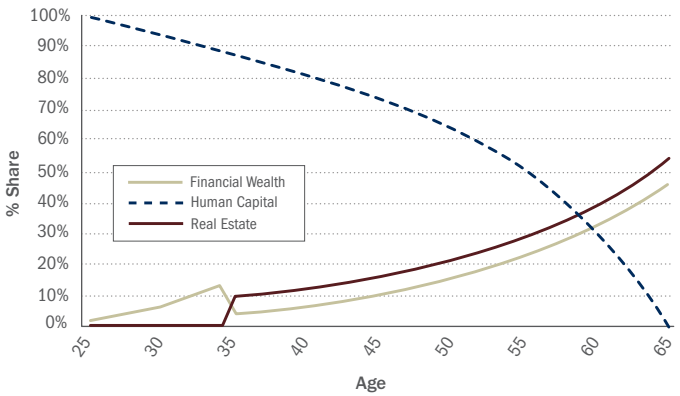


Source: IMG Portfolio Construction & Investment Analytics

ii. Total wealth, human capital and real estate

The Merrill Lynch methodology also explicitly models an assumed real estate wealth component based upon the age of the investor. This real estate component is a reallocation of a portion of traditional financial assets at the age of 35. The risk/return expectations and correlations for this explicit allocation to real estate have implications for asset allocations and therefore should be modeled separately from the traditional financial assets. Total wealth, beyond age 35, becomes a combination of financial wealth, real estate wealth and human capital. A stylized illustration of the relationship between human capital, real estate wealth and financial wealth over an investor's working years is shown in Figure 3.

Figure 3: Expected Human Capital, Financial Wealth and Real Estate Wealth

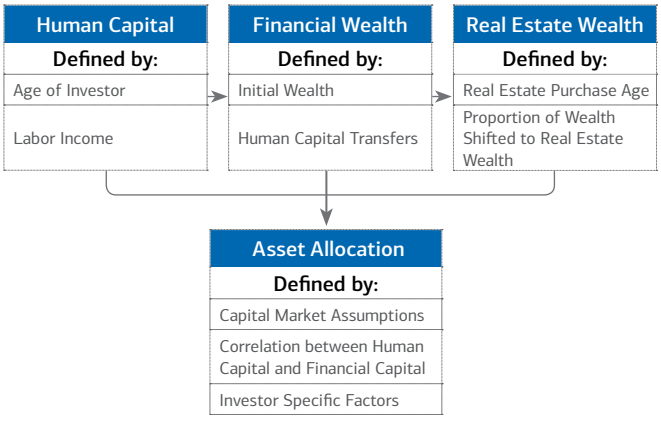


Source: IMG Portfolio Construction & Investment Analytics

iii. Total wealth, human capital and asset allocation

The relationship between human capital and financial capital (inclusive of real estate), investor-specific factors (such as savings rates and risk aversion), and the resulting asset allocation of financial capital is illustrated in Figure 4.

Figure 4: Relationship Among Human Capital, Financial Wealth and Asset Allocation



Source: IMG Portfolio Construction & Investment Analytics

iv. Evolving academic support

In the late 1960s, economists developed models suggesting that individuals should optimally maintain constant portfolio weights throughout their lives (Merton, 1969). These early models took no account of human capital or labor income. Merrill Lynch's methodology contends that pre-retirement investors are working and therefore earning labor income. This income can be discretely modeled for its present value over time as well as its correlation to more traditional asset classes. For younger investors, human capital is a significant proportion of total wealth and therefore a meaningful input for asset allocation decisions. More recent academic work has supported the human capital concept and a framework for its inclusion in the planning process (Campbell and Viceria, 2002).

The key theoretical implications for models that include labor income (Merton 1971; Bodie, Merton and Samuelson 1992; Campbell and Viciera, 2002) are as follows:

(a) Younger investors will invest more aggressively in stocks than older investors;

(b) Investors with more consistent labor income (thus "safer" human capital) will invest a greater proportion of their financial portfolio in stocks;

(c) Investors with labor income highly correlated with stocks will invest their financial assets less aggressively in stocks; and

(d) The investor's ability to adjust his or her labor supply (i.e., higher flexibility) also increases the aggressive allocation to stocks.

Empirical studies support that most investors do not consider the volatility of their human capital and therefore inefficiently allocate their financial portfolios. Benartzi and Thaler's 2001 study concluded that many investors use naive methods to determine asset allocations in addition to investing heavily in the stock of their company.

Empirical studies have also found that for the majority of U.S. households, human capital is a significant asset (Lee and Hanna 1995). Employing Survey of Consumer Finances data from the Federal Reserve, Lee and Hanna estimated that, for half of U.S. households, financial assets represented less than 1.3 percent of total wealth. When households were ranked by their percentage of financial wealth to total wealth, the 90th percentile households still had only 17.4 percent of their wealth in financial assets. This empirical evidence further reinforces the concept that for a vast majority of households, human capital and its role in an investor's wealth are critically important.

4. TARGET DATE ASSET ALLOCATION METHODOLOGY

i. Target date allocation optimization model

This section examines how we derived optimal target date asset allocation while considering human capital. The approach is a modification of the work originally completed by Chen, Ibbotson, Milevsky and Zhu (2007). In our model, labor income and the return of risky assets are correlated. An investor determines the allocation to equity, to maximize the year-end utility of total wealth (human capital plus financial wealth plus real estate wealth). Appendix ii lays out the formal specification of the model.

ii. Human capital and target date asset allocation modeling

The investor's human capital can be viewed as a risky asset if both the correlation with a given financial market index and the volatility of labor income are high. It can be viewed as a riskless asset if both correlation and volatility are low. In between these two extremes, human capital is a diversified portfolio of risky assets and riskless assets, plus idiosyncratic risk.

Campbell & Viciera (2002) examine the correlation between the stock market and labor income. They find a correlation coefficient from 0.32 to 0.52; the correlation of labor income with the stock market is larger and more significant for households with higher education.

(a) Data

In order to model human capital we have employed Survey of Consumer Finances income data produced by the Federal Reserve. The Target Date Asset Allocation Models available for use as guidance within the GoalManager® Portfolio Rebalancing Service assume median income by age.

(b) The human capital model

We have adopted the method described by Campbell and Viceira (2002) to model labor income. The model is described in appendix iii.

iii. Risk tolerance and target date asset allocation modeling

In the absence of human capital, the optimal asset allocation is constant and entirely dependent upon the expected returns and covariances of the asset classes and the risk aversion coefficient gamma.

The gamma values are calibrated in such a way that the optimal values are close to the equity allocations of the Merrill Lynch Wealth Management Strategic Asset Allocation portfolios.

iv. Asset Class Assumptions

The asset class assumptions for the traditional asset classes included estimates of the following components:

- The expected return
- The standard deviation
- The correlation coefficient among all asset classes

(a) Expected-return methodology

The expected return assumptions are based on a number of factors and analyses, including:

- A close examination of asset class performance over several economic cycles with the inclusion of recent market movements.
- Consideration of special events or circumstances, with the appreciation that future performance may not necessarily follow past patterns.
- Review of academic research and advanced analytical forecasting and statistical models.

In setting the asset class assumptions, we have adopted a forward looking view that we believe is realistic and does not merely assume that historical returns will continue to be realized in the future. It reflects our belief that it is more responsible to illustrate the effects of lower returns than to rely solely on best case scenarios.

Here are the reasons why:

- Inflation is likely to remain near low levels of the past decades. We also expect inflation to remain less volatile.
- Since the 1980s, asset valuations exhibited a significant rise that is unlikely to be repeated.
- The U.S. economy is unlikely to continue to grow at the same pace it has historically.

(b) Standard deviation methodology

For asset classes where sufficient historical data is available for the index proxy, the historical standard deviations are calculated employing data since the inception of the index.

For asset classes where data is not available for a long period, a ratio method is employed to calculate standard deviation. The ratio method uses an alternative index that is highly correlated with the original index but has a longer history. The ratio of the standard deviations of these two proxy indices over the common period of history is used to adjust the standard deviation of the index.

For asset classes where historical data suggest strong serial correlation effects, the standard deviation is corrected for serial correlation.

(c) Correlation coefficient methodology

Correlation estimates are based on historical values covering the time period (1970-2010) for the index proxies considered. The period from 1970 is selected to account for the structural change that occurred in the fixed income markets in this period.

Recognizing that it is optimal to use all available data rather than truncating the data to a common period, we have employed a statistical method first proposed by Stambaugh (1997). The technique uses recursive methods and regression analysis to exploit the entire data available in the calculation of a correlation matrix.

Table 4: Merrill Lynch Asset Class Assumptions

	U.S Stocks	U.S Bonds	Real Estate
Expected Return	8.0%	5.0%	5.9%
Expected Volatility	18.0%	7.5%	17.1%

Notes: The proxy for U.S. Stocks is the S&P 500 Index; for U.S. Bonds, it is a weighted average: 60% Ibbotson U.S. Long-Term Government Bond Index and 40% Ibbotson U.S. Long-Term Corporate Bond Index; for Real Estate it is FTSE-NAREIT Composite Index. These assumptions are provided for informational purposes only. They do not reflect actual investments, and there is no guarantee that these assumptions will be realized. Results are illustrative, and assume reinvestment of income and no transaction costs or taxes. You cannot invest directly in an index.

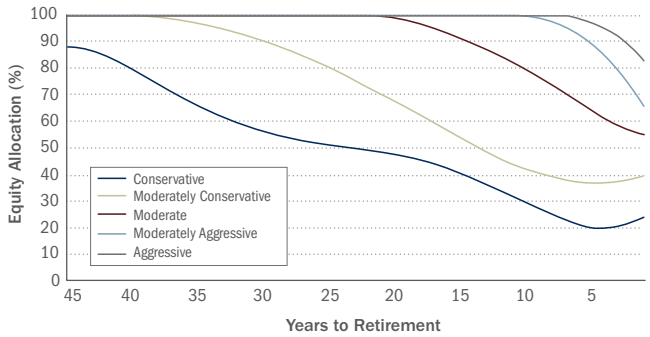
Source: IMG Portfolio Construction & Investment Analytics

v. Impact of varying assumptions

(a) How different assumptions generate different equity allocations: Risk tolerance

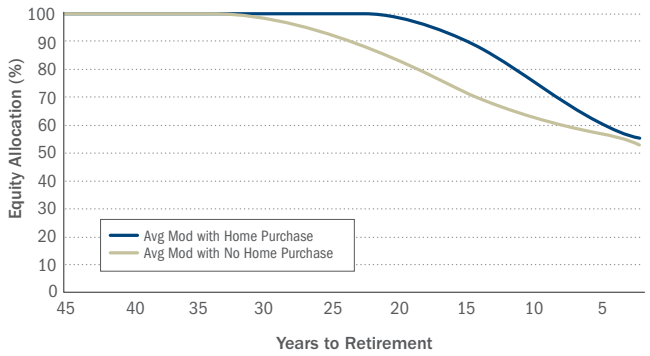
The Merrill Lynch Target Date Model can explicitly consider the risk tolerance of the investor. This is demonstrated below where risk is defined based on Merrill Lynch Wealth Management five risk categories. Figure 5 shows that the equity allocation progressively increases (decreases) as the investors become more aggressive (conservative). The Target Date Asset Allocations available for use as guidance within the GoalManager® Portfolio Rebalancing Service assumes a moderate risk tolerance.

Figure 5: Sensitivity Analysis: Risk Tolerance



Source: IMG Portfolio Construction & Investment Analytics

Figure 6: Sensitivity Analysis: Real Estate Purchase

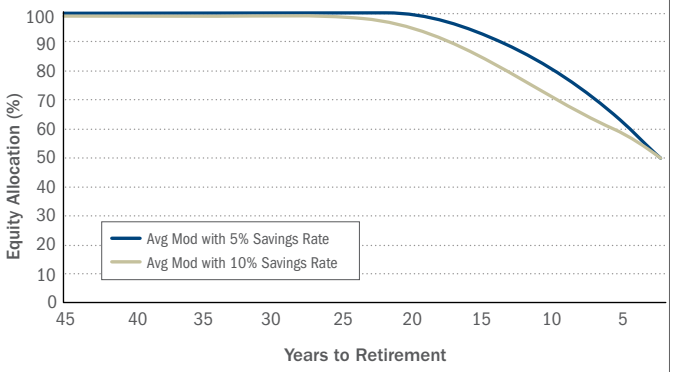


Source: IMG Portfolio Construction & Investment Analytics

(b) How different assumptions generate different equity allocations: Real estate wealth

Merrill Lynch Target Date Model sensitivity to the inclusion of real estate wealth is shown in Figure 6. Specifically, for an Average Moderate Investor, excluding real estate wealth decreases the equity allocation. The Target Date Asset Allocation Models available for use as guidance within the GoalManager® Portfolio Rebalancing Service assume real estate wealth assumptions beyond the age of 35.

Figure 7: Sensitivity Analysis: Savings Rate Assumption



Source: IMG Portfolio Construction & Investment Analytics

(c) How different assumptions generate different equity allocations: Savings rate

Merrill Lynch Target Date Model sensitivity to the savings rate is shown in Figure 7. Specifically, for an Average Moderate Investor the higher (lower) the savings rate the lower (higher) the equity allocation. The Target Date Asset Allocation Models available for use as guidance within the. GoalManager® Portfolio Rebalancing Service assume initial total household savings of 7% increasing by 0.1% each year.

vi. Risks associated with target date asset allocation investing for retirement

It is important that sponsors and participants are also aware of the associated risks with the target date approach to investing for retirement. These include:

- The approach assumes that everyone in the retirement group has the same needs regardless of potentially varied retirement goals.
- As demonstrated in Section 4 (v) "Impact of Varying Assumptions," model allocations are sensitive to changes in parameters including risk tolerance, affluence, retirement age, real estate purchase age, income, and contribution rate over time.
- Investor should understand that investments in Target Retirement Funds are subject to the risks of their underlying funds.
- Asset allocation for equivalent target date portfolios vary widely among firms.
- Tactical asset allocation views could be inconsistent with predefined target date allocations.

5. RETIREMENT INVESTING APPROACH

The preceding discussion has focused on guidance for the accumulation phase of lifecycle investing. Laster, Suri and Vrdoljak (2013) discusses several common pitfalls to which participants should be alert as they prepare for retirement. These include excessively conservative asset allocation.

Once the target date has been reached, a different strategy is needed to manage a participant's distributions. Since retirees have limited ability to recover from a decline in the value of their portfolios due to a market sell-off this strategy must be more conservative than the guidance for people still working but not excessively conservative. Our guidance on the earliest-dated portfolios (2010 and 2015) are designed to converge over a 7-year transition period to the retirement portfolio. Three years after the date of the portfolio, it will converge to the retirement portfolio. Thus, in 2013, the 2010 portfolio was the same as the retirement portfolio.

The retirement income guidance provided (see tables 1 and 2) is based on the Systematic Withdrawal Program (SWP) approach to retirement investing. A SWP resembles the way many clients invest during their working years. Retirees allocate their account to a fixed mix of investments, from which they periodically draw down funds and then rebalance. When well executed, a SWP can allow clients to meet their spending needs while sustaining their wealth throughout retirement.

The retirement allocations are derived based on minimizing a retiree's expected lifetime shortfall - the average amount by which retirees can expect to undershoot their lifetime spending plans. The guidance is based on these assumptions:

- The client is 67 years old
- The client spends 4% of wealth in the first year
- This spending grows with inflation
- The spending rate can be sustained with 90% certainty

For further details on the analysis underlying this approach, see Laster, Suri and Vrdoljak (2012).

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* For more on time-based segmentation, see Merrill Lynch Wealth Management, "A Framework for Managing Retirement Income," Fall 2009.

APPENDIX I : PREVIOUS YEAR'S TARGET DATE ASSET ALLOCATIONS

*Note: For current models tables refer to page 3 and 4.

Table 5: Target Date Asset Allocation Models from One Year Ago (Set I)

Asset Class	Target Date Asset Allocation Models (Set I)									
	Retirement	2015	2020	2025	2030	2035	2040	2045	2050	2055
Large Cap Value	10%	12%	15%	18%	20%	22%	22%	23%	23%	23%
Large Cap Growth	10%	12%	15%	18%	20%	22%	22%	23%	23%	23%
Mid Cap Value	3%	3%	4%	5%	6%	6%	7%	7%	7%	7%
Mid Cap Growth	3%	3%	4%	5%	6%	6%	7%	7%	7%	7%
Small Cap Value	1%	2%	2%	2%	3%	3%	3%	3%	3%	3%
Small Cap Growth	1%	2%	2%	2%	3%	3%	3%	3%	3%	3%
International Developed	10%	12%	16%	18%	20%	22%	24%	24%	24%	24%
Emerging Markets	2%	2%	2%	4%	4%	4%	4%	5%	5%	5%
Intermediate Fixed Income	55%	47%	35%	23%	13%	7%	3%	-	-	-
Money Market/Stable Value	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Percent Equity	40%	48%	60%	72%	82%	88%	92%	95%	95%	95%
Percent Fixed Income	60%	52%	40%	28%	18%	12%	8%	5%	5%	5%
Expected Arith. Avg. Return (Annl.)*	7.1%	7.4%	8.0%	8.6%	9.1%	9.3%	9.5%	9.7%	9.7%	9.7%
Expected Geo. Avg. Return (Annl.)*	6.8%	7.0%	7.4%	7.8%	8.1%	8.2%	8.3%	8.4%	8.4%	8.4%
Expected Volatility (Annl.)*	8.3%	9.3%	11.1%	13.1%	14.8%	15.7%	16.4%	17.0%	17.0%	17.0%

Please note that Investment Management & Guidance group may modify the intended percentage allocations of a target date portfolio.

* Expected Risk & Return based on Merrill Lynch Global Wealth Management Capital Market Assumptions 2013.

Note: Models as of January 2013

Table 6: Target Date Asset Allocation Models from One Year Ago (Set II)

Asset Class	Target Date Asset Allocation Models (Set II)									
	Retirement	2015	2020	2025	2030	2035	2040	2045	2050	2055
Large Cap Value	10%	12%	15%	18%	20%	22%	22%	23%	23%	23%
Large Cap Growth	10%	12%	15%	18%	20%	22%	22%	23%	23%	23%
Mid Cap Value	3%	3%	4%	5%	6%	6%	7%	7%	7%	7%
Mid Cap Growth	3%	3%	4%	5%	6%	6%	7%	7%	7%	7%
Small Cap Value	1%	2%	2%	2%	3%	3%	3%	3%	3%	3%
Small Cap Growth	1%	2%	2%	2%	3%	3%	3%	3%	3%	3%
International Value	5%	6%	8%	9%	10%	11%	12%	12%	12%	12%
International Growth	5%	6%	8%	9%	10%	11%	12%	12%	12%	12%
Emerging Markets	2%	2%	2%	4%	4%	4%	4%	5%	5%	5%
Interm. FI Corporate	12%	11%	8%	6%	3%	2%	1%	-	-	-
Interm. FI Government	24%	20%	14%	10%	6%	2%	2%	-	-	-
Interm. FI Mortgage	9%	8%	5%	3%	2%	1%	-	-	-	-
High Yield	5%	4%	4%	2%	1%	1%	-	-	-	-
TIPS	5%	4%	4%	2%	1%	1%	-	-	-	-
Money Market/Stable Value	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Percent Equity	40%	48%	60%	72%	82%	88%	92%	95%	95%	95%
Percent Fixed Income	60%	52%	40%	28%	18%	12%	8%	5%	5%	5%
Expected Arith. Avg. Return (Annl.)*	7.0%	7.4%	8.0%	8.6%	9.0%	9.3%	9.5%	9.7%	9.7%	9.7%
Expected Geo. Avg. Return (Annl.)*	6.7%	7.0%	7.4%	7.8%	8.0%	8.2%	8.3%	8.4%	8.4%	8.4%
Expected Volatility (Annl.)*	8.4%	9.6%	11.4%	13.2%	14.8%	15.8%	16.3%	16.9%	16.9%	16.9%

Please note that Investment Management & Guidance group may modify the intended percentage allocations of a target date portfolio.

* Expected Risk & Return based on Merrill Lynch Global Wealth Management Capital Market Assumptions 2013.

Note: Models as of January 2013

APPENDIX II: OPTIMIZATION MODEL

Formally, the optimization problem can be expressed as

$$\max_{(\alpha_x)} E[U(FW_{x+1} + RW_{x+1} + HC_{x+1})]$$

Subject to the budget constraints

$$C_x = C_{xr} * h_{cx}$$

$$W_{x+1} = (FW_x + hc_x - C_x)\left[\alpha_x e^{(\mu_s - \frac{1}{2}\sigma_s^2)+\sigma_s Z_s} + (1-\alpha_x)e^{rf}\right] + RW_{x+1} + HC_{x+1}$$

where

α_x = allocation to the financial assets; $0 \le \alpha_x \le 1$

FW_t = financial wealth at time t

RW_t = real estate wealth at time t

hc_x = value of labor income at current age

HC_x = present value of labor income at current age

r_f = return on the risk-free asset

S_t = value of the financial assets at time t. This value follows a discrete version of a geometric Brownian motion:

$$S_{t+1} = S_t \exp\left(\mu_s - \frac{1}{2}\sigma_s^2 + \sigma_s Z_{s,t+1}\right)$$

x = current age

y = retirement age

C_{xr} = Consumption rate

C_x = consumption in year x

μ_S = expected return of the risky asset

σ_S = standard deviation of the risky asset

Z_S = is a random variable, $Z_S \sim N(0.1)$

We assume that the investor follows the constant relativerisk aversion (CRRA) utility function:

$$U = \frac{(FW_{t+1}+RW_{t+1}+HC_{t+1})^{1-\gamma}}{1-\gamma}$$

γ = is the coefficient of relative risk aversion and is greater than zero.

APPENDIX III: HUMAN CAPITAL MODEL

Human capital calculated

$$HC_{x+1} = \sum_{j=t+1} \{h[c_{x+j} exp[-(j-t)(r_f+\eta_h+\zeta_h)]\}$$

where

η_h = risk premium (discount rate) for the income process;

$$= \frac{cov(Z_h, Z_s)}{var(Z_s)}(\mu_s - r_f)$$

$$= \rho[\mu_s - (e^{rf} - 1)]\frac{\sigma_h}{\sigma_s}$$

ζ_h = discount factor in human capital

The Labor Income Process

In the years prior to retirement x, and investors log labor income is given by

$$1n(hc_x) = f(x, Z_x) + v_x + \varepsilon_x$$

where

$f(x,Z_x)$ is a deterministic function of age and income Z_x

$\varepsilon_x \sim N(0,\sigma^2)$

Temporary Shock

$v_x = v_{x-1} + u_x$ where $u_x \sim N(0,\sigma_u^2)$

Permanent Shock

$u_x = \xi_x + w_x$

Thus, log income is the sum of a deterministic component that can be calibrated to capture the shape of earnings over the life cycle and two random components, one permanent and one transitory. We assume that the temporary shock ε_x is uncorrelated across households, but we decompose the permanent shock u_x into an aggregate component ξ_x and an idiosyncratic component w_x, uncorrelated across households.

APPENDIX IV: REAL ESTATE WEALTH

Real estate is modeled as

$$RW_{x+1} = RW_x \exp\left(\mu_{RW} - \frac{1}{2}\sigma_{RW}^2 + \sigma_{RW} Z_{RW,t+1}\right)$$

Note

$RW_{x+1} = 0$ for all $x < y$

$RW_{x+1} = \theta FW_x$ when $x < y$

Where

μ_{RW} = expected return of the real estate

σ_{RW} = standard deviation of the real estate

$Z_{RW,t}$ = is a random variable, $Z_{RW,t} \sim N(0.1)$

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Publications from IMG, Portfolio Construction & Investment Analytics

Winter	2014	Target Date Asset Allocation Methodology	Vrdoljak/Laster/Suri
Winter	2014	Can Variable Annuities Help You Meet Your Retirement Goals?	Laster/Suri/Vrdoljak
Summer	2013	Pitfalls in Retirement	Laster/Suri/Vrdoljak
Spring	2013	How Immediate Annuities Can Help Meet Retirement Goals	Laster/Suri
Winter	2013	A Path to Retirement Success	Suri/Laster/Liersch/Vrdoljak
Winter	2013	Claiming Social Security	Laster/Suri
Winter	2013	Managing Your Personal Liabilities	Vrdoljak/Laster/Suri
Winter	2012	Systematic Withdrawal Strategies for Retirees	Laster/Suri/Vrdoljak

The 'target date' of the portfolio model represents the approximate date in which an investor might plan to begin withdrawing money. The principal value of the portfolio model is not guaranteed at any time, including the prescribed targeted date. As the targeted date approaches, the objective and investment strategy of the portfolio model will generally become more conservative.

GWM Investment Management & Guidance (IMG) provides industry-leading investment solutions, portfolio construction advice and wealth management guidance.

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