

CHIEF INVESTMENT OFFICE

Target Date Asset Allocation

A Goals-Based Approach

January 2021

All data, projections and opinions are as of the date of this report and subject to change.

1. EXECUTIVE SUMMARY

The Chief Investment Office (CIO) within Bank of America Corporation provides financial guidance 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. We have leveraged our expertise in goals-based investing to develop an innovative approach to target-date or “life cycle” investing.

A Target Date Asset Allocation is a long-term investment for an individual with a specific retirement date in mind. As the target date approaches, the allocation gradually shifts the investor’s holdings toward lower-risk investments. Our Target Date Asset Allocation applies a goals-based approach to arrive at appropriate allocations across a participant’s investment horizon. The guidance is sensitive to varying assumptions regarding risk tolerance, retirement age, current age, years in retirement, inflation and capital market assumptions.

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 work for every investor’s individual situation. For more details regarding the risks associated with target date allocations refer to Section 3 (vii) page 8.

This document aims to outline the principles and methodology we used to develop our Target Date Asset Allocation approach and key results.

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Data as of 1/15/2021, and subject to change.

SUMMARY

Our Target Date Asset Allocation methodology applies a goals-based approach to arrive at appropriate allocations at different time horizons.

This document aims to outline the principles and methodology the CIO used to develop our Target Date Asset Allocation approach and key results.

Our Target Date Asset Allocations have changed due to updates to CIO Capital Market Assumptions (CMAs).

The retirement allocation 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. Bank of America is a marketing name for the Retirement Services business of Bank of America Corporation (“BofA Corp.”). Banking activities may be performed by wholly owned banking affiliates of BofA Corp., including Bank of America, N.A., member FDIC. Brokerage and investment advisory services are provided by wholly owned non-bank affiliates of BofA Corp., including Merrill Lynch, Pierce, Fenner & Smith Incorporated (also referred to as “MLPF&S” or “Merrill”), a registered broker-dealer and investment adviser and member SIPC. Investment products:

Are Not FDIC Insured	Are Not Bank Guaranteed	May Lose Value
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2. TARGET DATE ASSET ALLOCATIONS

i. What is a Target Date Asset Allocation?

A Target Date Asset Allocation is designed to be a long-term investment for an individual with a specific retirement date in mind. For example, a 2030 target date allocation is constructed to accommodate the investment needs of someone planning to retire in that year. In our view, target date allocations make it easier to invest for retirement by automatically rebalancing 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 allocations entail risk. The allocations have material exposure to equities, even once the target retirement date is reached. The CIO 2020 target date allocation, for example, has a 57% allocation to equities. This is because someone retiring in 2020 has a substantial chance of living another two or three decades and therefore still could have 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 43% allocation to equities 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 4 page 9.

Table 1: Target Date Asset Allocations (Set I)

Asset Class	Target Date Asset Allocations (Set I)									
	Retirement	2020	2025	2030	2035	2040	2045	2050	2055	2060
Equity	43%	57%	66%	77%	86%	95%	95%	95%	95%	95%
U.S. Large Cap Growth	12%	16%	19%	22%	24%	27%	27%	27%	27%	27%
U.S. Large Cap Value	15%	18%	21%	24%	27%	30%	30%	30%	30%	30%
U.S. Small Cap Growth	1%	2%	2%	3%	3%	3%	3%	3%	3%	3%
U.S. Small Cap Value	1%	2%	2%	2%	3%	3%	3%	3%	3%	3%
International Developed Equity	10%	13%	15%	18%	20%	22%	22%	22%	22%	22%
Emerging Markets	4%	6%	7%	8%	9%	10%	10%	10%	10%	10%
Fixed Income	55%	41%	32%	21%	12%	3%	3%	3%	3%	3%
Cash	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Expected Arithmetic (Arith). Avg. Return Annualized (Annl.) ¹	6.2%	7.1%	7.7%	8.3%	8.9%	9.4%	9.4%	9.4%	9.4%	9.4%
Expected Geometric (Geo.) Avg. Return (Annl.) ¹	5.9%	6.6%	7.0%	7.4%	7.8%	8.1%	8.1%	8.1%	8.1%	8.1%
Expected Volatility (Annl.) ¹	8.1%	10.5%	12.2%	14.2%	15.9%	17.6%	17.6%	17.6%	17.6%	17.6%

Source: Chief Investment Office. Please note that CIO may modify the intended percentage allocations.

¹ Note: The expected return and volatility are based on CIO Capital Market Assumptions, 2021. Allocations as of January 2021.

This chart is intended for illustrative purposes only and is not intended to be representative of the past or future performance of any particular investment. Actual rates of return cannot be predicted and will fluctuate. Asset allocation cannot eliminate the risk of fluctuating prices and uncertain returns. Please note that asset classes are represented by indexes.

Note: The arithmetic mean, a simple average, provides an unbiased estimate of an uncertain variable such as future returns. If, however, when we seek to estimate future compound returns, the more appropriate measure is the geometric mean return. This is the return that, when compounded over the period of time in question, produces the actual realized cumulative return. The arithmetic return of a variable will always be greater than or equal to its geometric return. The greater the volatility, the wider the gap between the arithmetic and geometric returns. Volatility, which reflects future return expectations, is measured as the standard deviation of annual returns. Standard deviation is a common statistical measure that conveys the deviation of a variable (such as asset returns) around its mean.

Please refer to the end of the paper for Index Definitions and Asset Class Disclosures..

Target Date Asset Allocations, 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 allocations 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 allocation.

ii. Target Date Asset Allocations

The Target Date Asset Allocations 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 fixed income sub-asset classes.

As a result of the CIO annual review process, the allocations have changed from the Target Date Asset Allocations provided last year (see Appendix I). The changes have resulted in an decrease on average of one percentage points in equity allocations across the retirement, 2020 to 2060 allocations. The changes are due to updates in CIO Capital Market Assumptions (see Section 3).

Table 2 provides the Target Date Asset Allocations (Set II) for a more granular depiction of the style allocation, including

specific percentages associated with fixed income concentrations.

Table 2: Target Date Asset Allocations (Set II)

Asset Class	Target Date Asset Allocations (Set II)									
	Retirement	2020	2025	2030	2035	2040	2045	2050	2055	2060
Equity	43%	57%	66%	77%	86%	95%	95%	95%	95%	95%
U.S. Large Cap Growth	12%	16%	19%	22%	24%	27%	27%	27%	27%	27%
U.S. Large Cap Value	15%	18%	21%	24%	27%	30%	30%	30%	30%	30%
U.S. Small Cap Growth	1%	2%	2%	3%	3%	3%	3%	3%	3%	3%
U.S. Small Cap Value	1%	2%	2%	2%	3%	3%	3%	3%	3%	3%
International Developed Equity	10%	13%	15%	18%	20%	22%	22%	22%	22%	22%
Emerging Markets	4%	6%	7%	8%	9%	10%	10%	10%	10%	10%
Fixed Income	55%	41%	32%	21%	12%	3%	3%	3%	3%	3%
U.S. Government	16%	13%	10%	7%	3%	1%	1%	1%	1%	1%
U.S. Mortgages	13%	10%	8%	5%	3%	1%	1%	1%	1%	1%
U.S. Corporates	16%	13%	11%	7%	4%	1%	1%	1%	1%	1%
U.S. High Yield	3%	3%	2%	1%	1%	0%	0%	0%	0%	0%
International Fixed Income	7%	2%	1%	1%	1%	0%	0%	0%	0%	0%
Cash	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Expected Arith. Avg. Return (Annl.) ¹	6.4%	7.2%	7.8%	8.4%	8.9%	9.5%	9.5%	9.5%	9.5%	9.5%
Expected Geo. Avg. Return (Annl.) ¹	6.1%	6.7%	7.1%	7.5%	7.8%	8.1%	8.1%	8.1%	8.1%	8.1%
Expected Volatility (Annl.) ¹	8.3%	10.7%	12.3%	14.3%	16.0%	17.6%	17.6%	17.6%	17.6%	17.6%

Source: Chief Investment Office. Please note that CIO may modify the intended percentage allocations.

¹ Note: Expected return and risk is based on CIO Capital Market Assumptions, 2021.

Allocations as of January, 2021.

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Please refer to the end of the paper for Index Definitions and Asset Class Disclosures.

iii. Target date assumptions

Table 3, below, provides the model assumptions used to develop the Target Date Asset Allocations.

and specifies the relationship between the Target Date Assumptions and the Target Date Asset Allocation Methodology.

Section 3 details the assumptions outlined within the chart below

Table 3: Target Date Model Assumptions for 2021

Target Date Model Assumptions for 2021	
Parameter	Assumption/Input
Capital Market Assumptions	CIO 2021 CMAs
Allocation constraints	CIO Strategic Asset Allocation (SAA) Tier 0 Efficient Frontier ¹
Inflation	2.0%
Confidence level (CL)	Beginning = 75%; Ending = convergence to the Moderate risk profile Confidence Level (CL)
Starting age	Age 23
Retirement age	Age 65
Years in retirement	26 Years ²
Retirement allocation	Systematic Withdrawal Rate at age 65 CL 90%

¹ The allocations under consideration are obtained from the efficient frontier generated by the investment profile of the SAA. The efficient frontier is the set of portfolios that offers the highest expected return for a defined level or the lowest risk for a given level of expected return. Tier 0 (highest liquidity): Highest liquidity needs with none of the portfolio invested in less liquid alternative asset categories.

² Based on reference to IRS single life expectancy table + 5 years. Table I in Appendix B in Publication 590-B at [irs.gov/pub/irs-pdf/p590b.pdf](https://www.irs.gov/pub/irs-pdf/p590b.pdf) (page 45).

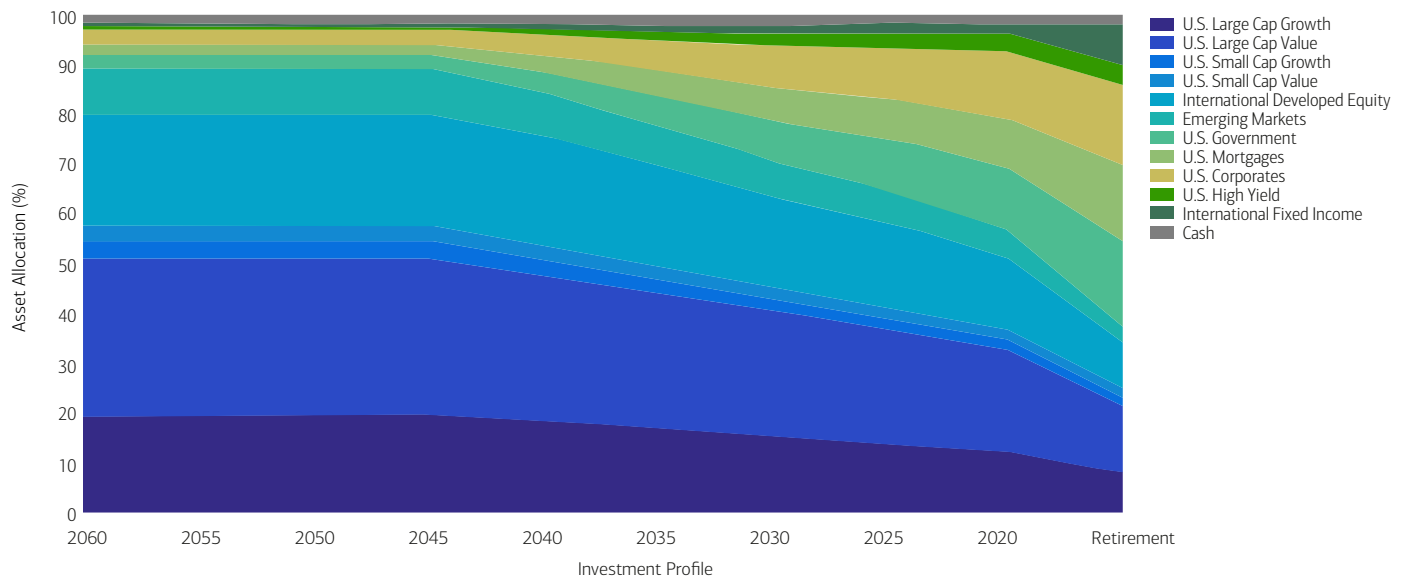
Source: Chief Investment Office.

iv. Target date glide path representation

Exhibit 1 depicts the Target Date Asset Allocation Glide

Path, showing how the allocations are expected to change as retirement nears.

Exhibit 1: Target Date Asset Allocation Glide Path



Source: Chief Investment Office. For illustrative purposes only.

3. TARGET DATE ASSET ALLOCATION METHODOLOGY

i. Goals-Based Approach: Framework and theory

The mean-variance framework developed in Markowitz's (1952) groundbreaking paper, "Portfolio Selection," has in recent decades become the workhorse model for wealth and investment managers. In this framework, each investor weighs the expected return on her overall portfolio against its variance (or standard deviation) to identify the efficient portfolio that delivers the highest expected return for the level of risk the investor is willing to bear.

The approach takes no explicit account of whether the portfolio helps the investor achieve her goals. It also fails to account for the array of well-documented behavioral propensities that individuals exhibit. The approach is appropriate for investors who seek to achieve all their goals by investing in a single mean-variance efficient portfolio. However, as Thaler (1985) suggests, investors typically do not focus on overall portfolio performance. Rather, they are prone to mental accounting and to making investment decisions based on the specific goal to be met.

An emerging consensus in the wealth management industry favors a goals-based approach to advising clients on asset allocation and wealth management: see Brunel (2003, 2006) and Nevin (2004).

Under the goals-based wealth management framework, investors first specify their goals and priorities. Each investment goal with its associated portfolio is treated separately and solved independently. Because each goal is likely to be met with some acceptable degree of uncertainty, investors may be less prone to overreact to extreme market conditions.

ii. Goals-Based Approach: Risk-adjusted discounting

The key intuition of the goals-based approach (Wang, Suri, Laster, & Almadi, 2011) is "risk-adjusted discounting." Given:

- a) A single cash-flow goal defined by a time horizon T , confidence level $1-\alpha$, target amount W and,
- b) An available investment asset with expected return μ and volatility. The estimated initial wealth required to invest in the selected asset to achieve the target wealth for the desired time horizon and confidence level is computed as below

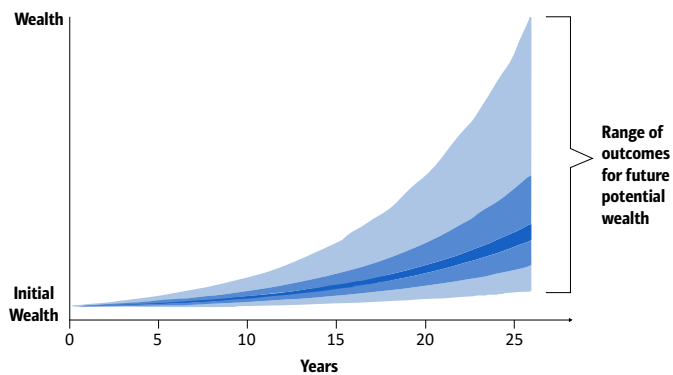
(illustrated in Exhibit 2):

where Φ^{-1} denotes the inverse cumulative distribution function of

$$\text{Est. Initial Wealth} = W * \exp\left(-\left(\mu - \frac{1}{2}\sigma^2\right)T - \Phi^{-1}(\alpha)\sigma\sqrt{T}\right)$$

the standard normal distribution.

Exhibit 2: Potential Wealth of Goals



Source: Chief Investment Office. For illustrative purposes only. This may not reflect any specific investor's facts or circumstances.

iii. Goals-Based Approach: Multi-period single goals and lockbox separation

Consider a goal requiring a stream of annual cash flows with a pre-specified confidence level. Sharpe (2007) develops the lockbox separation concept for this in a complete discrete time market, in which each goal is treated separately. It is argued in Wang, Suri, Laster, & Almadi (2011) that the optimal solution to the investment decision problem is the sum of the optimal solutions corresponding to the investment problems in which each cash flow requirement is treated separately.

For example, an investor would like to receive a series of annual pre-specified cash-flows over 30 years following retirement, with the pre-specified confidence level assigned to each cash-flow. The solution to this problem is a decomposition of the goal into 30 separate single cash-flow goals. Then the optimal solution is just the sum of 30 solutions to the single period goal problems.

iv. Goals-Based Approach: Assumptions

Lockbox Separation. Each cash-flow within each goal is treated separately. In our view, this is a reasonable assumption, based on similar arguments as made by Sharpe (2007), where it was argued that in a complete discrete market any strategy can be implemented by dividing initial wealth among a series of "lockboxes," each designed to fund spending at a particular date using a predetermined investment strategy for managing the funds until that date. It is also a realistic assumption, since it is natural to think about segregating the assets based on desired goals.

Geometric Brownian Motion. Asset returns are assumed to follow geometric brownian motion (GBM). We believe this is a reasonable assumption, which is widely used throughout the financial industry as outlined in Marathe & Ryan (2005).

Continuous Rebalancing. The model assumes that asset allocations are maintained at a pre-determined fixed level through continuous rebalancing.

v. Input: Capital market assumptions

A key input to deriving the Target Date Asset Allocations are the CIO Capital Market Assumptions. The assumptions are long-term views on a set of asset classes (shown in Table 4). More specifically, they provide estimates of expected returns and volatility for each asset class, as well as correlations among the asset classes, for a 25-year planning horizon.

To develop the Capital Market Assumptions, the CIO uses a proprietary model that is guided by economic theory. The model reflects the dynamic interrelationships between asset class returns and a set of financial risk factors.

The model is based on the principle that long-term returns provide compensation for exposure to risk factors. Risky assets (such as stocks) tend to have higher expected returns than safe assets (such as Treasury bills). To develop the Capital Market Assumptions, for each asset class, we identify risk factors that we believe help explain returns. Each of the risk factors along with the market indexes used as proxies for them:

- has been found in academic research to represent systematic sources of risk
- exhibits a significant risk premium that is expected to persist in the future, and
- has extensive historical data available.

Historical data is used to estimate the empirical relationship between each asset class and the risk factors. For each asset class, some factors will be relevant to return performance and others not.

Taking current market conditions such as interest rates and equity market valuation levels as a starting point, the model simulates the future value of the risk factors based on the dynamics among them. Then, based on these values, it simulates future asset class returns. Finally, it uses the simulation results to estimate the expected returns and the volatility of returns for each asset class, as well as return correlations.

This simulation-based approach captures several important aspects of returns. In particular, the Capital Market Assumptions:

- allow for risk factors that vary over the planning horizon,
- may deviate from historical averages, and
- capture current market conditions as they evolve in simulations.

Because of this, the CIO reviews the Capital Market Assumptions every year. In the reviews, historical data is first updated to reflect the financial and economic developments of the past year. Then, the updated Capital Market Assumptions are generated using a CIO proprietary model, and the Global Wealth & Investment Management Investment Strategy Committee reviews and votes on them.

Table 4: Asset Class Assumptions

Asset Class	Geometric Return	Arithmetic Return	Volatility
Inflation	2.0%	2.0%	1.6%
Equity			
U.S. Large Cap Growth	8.1%	10.1%	21.3%
U.S. Large Cap Value	8.9%	10.3%	17.8%
U.S. Small Cap Growth	9.3%	11.9%	24.5%
U.S. Small Cap Value	9.6%	11.5%	21.1%
International Developed Equity	6.3%	8.6%	22.5%
Emerging Markets	5.8%	8.8%	26.1%
Fixed Income			
U.S. Government	3.1%	3.3%	5.1%
U.S. Mortgages	3.6%	3.7%	6.0%
U.S. Corporates	4.2%	4.4%	6.7%
U.S. High Yield	5.3%	5.7%	9.1%
International Fixed Income	3.3%	3.4%	4.1%
Cash	2.4%	2.4%	1.7%

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Note: The arithmetic mean, a simple average, provides an unbiased estimate of an uncertain variable such as future returns. If, however, when we seek to estimate future compound returns, the more appropriate measure is the geometric mean return. This is the return that, when compounded over the period of time in question, produces the actual realized cumulative return. The arithmetic return of a variable will always be greater than or equal to its geometric return. The greater the volatility, the wider the gap between the arithmetic and geometric returns. Volatility, which reflects future return expectations, is measured as the standard deviation of annual returns. Standard deviation is a common statistical measure that conveys the deviation of a variable (such as asset returns) around its mean.

Please refer to the end of the paper for Asset Class Disclosures and Index Definitions.

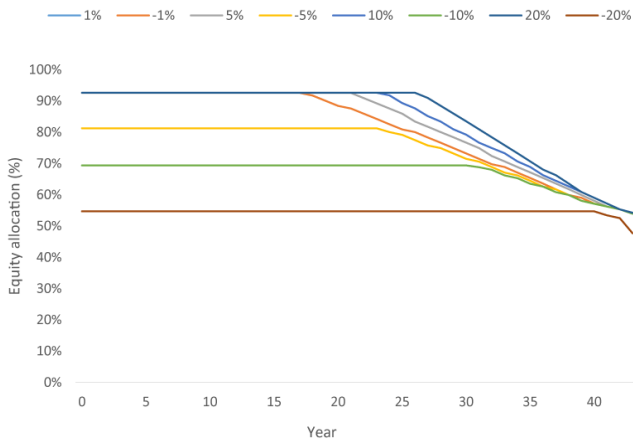
Source: Chief Investment Office, Data as of January 2021

vi. Impact of varying assumptions

(a) How different assumptions generate different equity allocations: Expected asset class returns

A key input to the Target Date Allocations are the asset class assumptions shown in Table 4. Exhibit 3 at the top of the next page shows the sensitivity and stress test results for varying changes in the expected returns. The equity glide path is not sensitive to small changes; however, it is generally sensitive to large negative stress scenarios.

Exhibit 3: Sensitivity Analysis: Expected returns

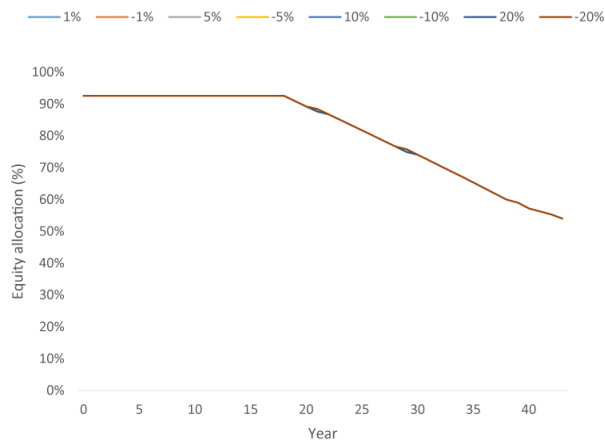


Source: Chief Investment Office, For illustrative purposes only.

(b) How different assumptions generate different equity allocations: Inflation rate

An input to the Target Date Allocations is the inflation rate. Exhibit 4 below shows the sensitivity and stress test results for varying changes in the inflation rate. The equity glide path is not sensitive to changes in the inflation rate.

Exhibit 4: Sensitivity Analysis: Inflation rate

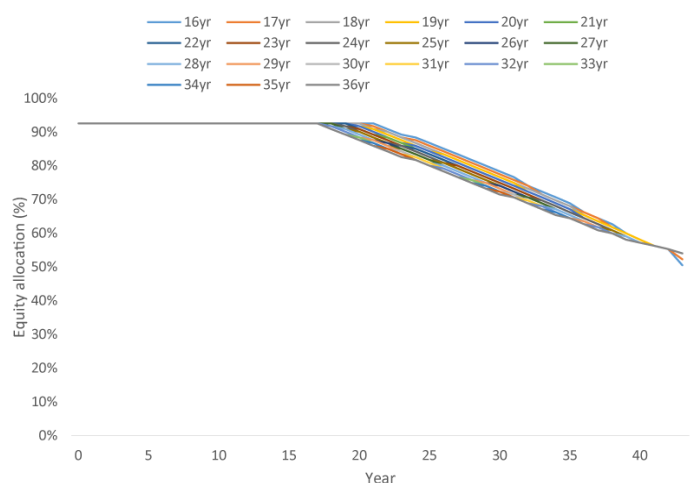


Source: Chief Investment Office, For illustrative purposes only.

(c) How different assumptions generate different equity allocations: Years in retirement

Our Target Date Asset Allocations assumes the time in retirement is 26 years. Exhibit 5 shows the sensitivity test results for changes to the years in retirement. The equity glide path is not sensitive to changes in the years in retirement.

Exhibit 5: Sensitivity Analysis: Years in retirement

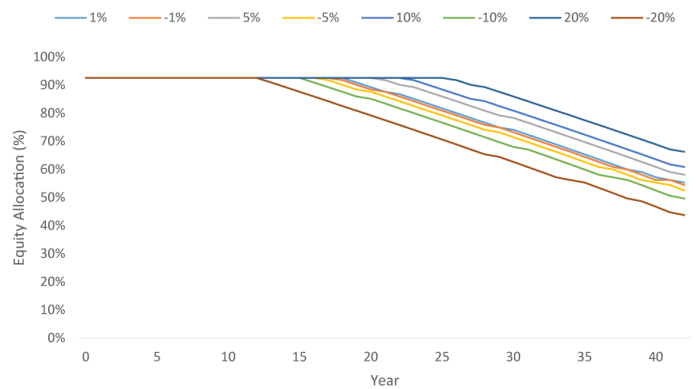


Source: Chief Investment Office, For illustrative purposes only.

(d) How different assumptions generate different equity allocations: Ending equity weight

Our Target Date Allocations assumes the ending equity weight is equal to the moderate risk allocation. Exhibit 6 below shows the sensitivity and stress test results for changes to the ending equity weight. The equity glide path is not sensitive to changes in the ending equity weight.

Exhibit 6: Sensitivity Analysis: Ending equity weight



Source: Chief Investment Office, For illustrative purposes only.

vii. Risks associated with Target Date Asset Allocation investing

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

- The approach assumes that enrolled plan participants opting into the same target-date investment options have the same needs, regardless of potentially varied retirement goals.

- As demonstrated in Section 3 (vi) “Impact of varying assumptions,” allocations are sensitive to changes in parameters including expected return and ending equity weight.
- Investors should understand that investments in Target Retirement Funds are subject to the risks of their underlying funds.
- Asset allocation for equivalent target date allocations vary widely among firms.
- Tactical asset allocation views could be inconsistent with predefined target date allocations.

4. RETIREMENT INVESTING APPROACH

The preceding discussion has focused on guidance for the accumulation phase of lifecycle investing. Suri and Vrdoljak (2020) discussed several common pitfalls to which participants should be alerted as they prepare for retirement. Chief among these concerns is taking too little risk in retirement and potentially falling short of necessary growth to fund a longer retirement period.

Once the target date has been reached, a different strategy may be needed to manage a participant’s distributions. Since retirees may have limited ability to recover from a decline in the value of their investments due to a market sell-off, in retirement, we believe it is advisable to take less risk during distribution years versus while working during accumulation years. Our retirement guidance is a 43% allocation to equities.

The retirement allocation is based on the following assumptions:

- The participant retires at age 65.
- The planning horizon is based on participant’s life expectancy +5 years.
- The spending rate can be sustained with 90% confidence.
- The client spends the systematic withdrawal rate as a percentage of wealth in the first year.
- This spending grows with inflation.
- Does not take into account fees, taxes or assumed excess returns from active management decisions.

The retirement guidance provided in Tables 5 and 6 assumes that the client sets an initial spending level, which then grows with inflation. Retirees allocate their account to a fixed mix of investments, from which they periodically draw down funds and then rebalance. When well executed, the approach can allow clients to meet their spending needs while sustaining their wealth throughout retirement.

Many in the industry advocate the “4% rule,” which states that clients can realistically afford to spend 4% of their wealth each year. We find this rule overly simplistic. We believe we offer more nuanced guidance regarding the rate at which a retiree can sustainably spend, critically dependent on a client’s age and risk tolerance. Thus, we believe there is no one-size-fits-all guidance for spending rates.

The systematic withdrawal rates and retirement allocations below are derived based on measuring the likelihood that a retiree will be able to spend according to plan without exhausting her wealth. For example, a 65-year-old with \$1 million can draw down 4.34%, or \$43,400, next year and amounts that increase in line with inflation in subsequent years with a 90% confidence level.

Table 5: Systematic Withdrawal Rates

		Systematic Withdrawal Rates ¹		
Probability of Success		95%	90%	75%
Level of confidence		High	Moderate	Low
Age	55	3.32%	3.67%	4.64%
	60	3.62%	3.95%	4.90%
	65	4.02%	4.34%	5.25%
	70	4.57%	4.86%	5.74%
	75	5.36%	5.65%	6.49%
	80	6.23%	6.54%	7.36%
	85	7.53%	7.86%	8.64%

¹ Note: The systematic withdrawal rate is the maximum initial share of wealth that we believe a client can spend while attaining a desired “probability of success.” The probability of success measures the likelihood that a retiree will be able to spend according to plan without exhausting wealth. Spending is assumed to rise each year with inflation.

Source: Chief Investment Office

Table 6: Equity Allocations

		Equity Allocations ¹		
Probability of Success		95%	90%	75%
Level of confidence		High	Moderate	Low
Age	55	26%	43%	98%
	60	26%	43%	88%
	65	26%	43%	88%
	70	26%	43%	88%
	75	26%	26%	74%
	80	26%	26%	59%
	85	26%	26%	59%

¹ Note: The equity allocation is the allocation that we believe supports the systematic withdrawal rate.

Source: Chief Investment Office

5. REFERENCES

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APPENDIX I : PREVIOUS YEAR'S TARGET DATE ASSET ALLOCATIONS

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

Table 7: Target Date Asset Allocations from One Year Ago (2020) (Set I)

Asset Class	Target Date Asset Allocations (Set I)									
	Retirement	2020	2025	2030	2035	2040	2045	2050	2055	2060
Equity	43%	58%	66%	77%	85%	95%	98%	98%	98%	98%
U.S. Large Cap Growth	12%	17%	19%	22%	24%	27%	28%	28%	28%	28%
U.S. Large Cap Value	15%	18%	21%	24%	27%	30%	31%	31%	31%	31%
U.S. Small Cap Growth	1%	2%	2%	3%	3%	3%	3%	3%	3%	3%
U.S. Small Cap Value	1%	2%	2%	2%	3%	3%	3%	3%	3%	3%
International Developed Equity	10%	13%	15%	18%	19%	22%	22%	22%	22%	22%
Emerging Markets	4%	6%	7%	8%	9%	10%	11%	11%	11%	11%
Fixed Income	55%	40%	32%	21%	13%	3%	0%	0%	0%	0%
Cash	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Expected Arith. Avg. Return (Annl.) ¹	6.4%	7.3%	7.8%	8.5%	9.0%	9.5%	9.7%	9.7%	9.7%	9.7%
Expected Geo. Avg. Return (Annl.) ¹	6.1%	6.8%	7.1%	7.5%	7.7%	8.0%	8.1%	8.1%	8.1%	8.1%
Expected Volatility (Annl.) ¹	6.1%	10.6%	12.1%	14.2%	15.6%	17.6%	18.1%	18.1%	18.1%	18.1%

Please note that the CIO group may modify the intended percentage allocations.

¹ Note: The expected return and risk is based on CIO Capital Market Assumptions, 2020.

Source: Chief Investment Office, Allocations as of January, 2020.

Table 8: Target Date Asset Allocations from One Year Ago (2020) (Set II)

Asset Class	Target Date Asset Allocations (Set II)									
	Retirement	2020	2025	2030	2035	2040	2045	2050	2055	2060
Equity	43%	58%	66%	77%	85%	95%	98%	98%	98%	98%
U.S. Large Cap Growth	12%	17%	19%	22%	24%	27%	28%	28%	28%	28%
U.S. Large Cap Value	15%	18%	21%	24%	27%	30%	31%	31%	31%	31%
U.S. Small Cap Growth	1%	2%	2%	3%	3%	3%	3%	3%	3%	3%
U.S. Small Cap Value	1%	2%	2%	2%	3%	3%	3%	3%	3%	3%
International Developed Equity	10%	13%	15%	18%	19%	22%	22%	22%	22%	22%
Emerging Markets	4%	6%	7%	8%	9%	10%	11%	11%	11%	11%
Fixed Income	55%	40%	32%	21%	13%	3%	0%	0%	0%	0%
U.S. Government	16%	12%	10%	7%	4%	1%	0%	0%	0%	0%
U.S. Mortgages	13%	10%	8%	5%	3%	1%	0%	0%	0%	0%
U.S. Corporates	16%	13%	10%	7%	4%	1%	0%	0%	0%	0%
U.S. High Yield	3%	3%	2%	1%	1%	0%	0%	0%	0%	0%
International Fixed Income	7%	2%	2%	1%	1%	0%	0%	0%	0%	0%
Cash	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Expected Arith. Avg. Return (Annl.) ¹	6.6%	7.5%	7.9%	8.5%	9.0%	9.6%	9.7%	9.7%	9.7%	9.7%
Expected Geo. Avg. Return (Annl.) ¹	6.3%	6.9%	7.2%	7.5%	7.8%	8.0%	8.1%	8.1%	8.1%	8.1%
Expected Volatility (Annl.) ¹	8.2%	10.8%	12.2%	14.2%	15.7%	17.6%	18.1%	18.1%	18.1%	18.1%

Please note that the CIO group may modify the intended percentage allocations.

¹ Note: The expected return and risk is based on CIO Capital Market Assumptions, 2020.

Source: Chief Investment Office, Allocations as of January, 2020.

Tables 7 & 8 are intended for illustrative purposes only and are not intended to be representative of the past or future performance of any particular investment. Actual rates of return cannot be predicted and will fluctuate. Asset allocation cannot eliminate the risk of fluctuating prices and uncertain returns. Please note that asset classes are represented by indexes.

Note: The arithmetic mean, a simple average, provides an unbiased estimate of an uncertain variable such as future returns. If, however, when we seek to estimate future compound returns, the more appropriate measure is the geometric mean return. This is the return that, when compounded over the period of time in question, produces the actual realized cumulative return.

The arithmetic return of a variable will always be greater than or equal to its geometric return. The greater the volatility, the wider the gap between the arithmetic and geometric returns.

Volatility, which reflects future return expectations, is measured as the standard deviation of annual returns. Standard deviation is a common statistical measure that conveys the deviation of a variable (such as asset returns) around its mean.

Please refer to the end of the paper for Asset Class Disclosures and Index Definitions.

Index Definitions and Asset Class Disclosures

Asset class	Index	Description
Cash	ICE BofAML U.S. Treasury Bill 3 months	For the U.S. Treasury Bill index, data from <i>The Wall Street Journal</i> are used for 1977 to the present; the CRSP U.S. Government Bond File is the source from 1926 to 1976. Each month a one-bill portfolio containing the shortest-term bill having not less than one month to maturity is constructed. (The bill's original term to maturity is not relevant.)
U.S. Large Cap Growth	Russell 1000 Growth TR	Russell 1000 Growth Total Return measures the performance of the large-cap growth segment of the U.S. equity universe. It includes those Russell 1000 companies with higher price-to-book ratios and higher forecasted growth values.
U.S. Large Cap Value	Russell 1000 Value TR	Russell 1000 Value Total Return measures the performance of the large-cap value segment of the U.S. equity universe. It includes those Russell 1000 companies with lower price-to-book ratios and lower expected growth values.
U.S. Small Cap Growth	Russell 2000 Growth Total Return	Russell 2000 Growth Total Return measures the performance of the broad growth segment of the U.S. equity universe. It includes those Russell 2000 companies with higher price-to-book ratios and higher forecasted growth values.
U.S. Small Cap Value	Russell 2000 Value Total Return	Russell 2000 Value Total Return measures the performance of the large-cap value segment of the U.S. equity universe. It includes those Russell 2000 companies with lower price-to-book ratios and lower expected growth values.
International Equity	MSCI Daily TR Net World Ex USA USD	The MSCI World ex USA Index captures large and mid-cap representation across 22 of 23 developed markets (DM) countries—excluding the United States. The index covers approximately 85% of the free float-adjusted market capitalization in each country.
Emerging Markets	MSCI Daily TR Net EM USD	The MSCI Emerging Markets (EM) Index captures large and mid-cap representation across 23 emerging markets countries and targets coverage of approximately 85% of the free float-adjusted market capitalization in each country.
U.S. Government	ICE BofA AAA U.S. Treasury/Agency Master	The ICE BofA US Treasury & Agency Index tracks the performance of US dollar-denominated US Treasury and non-subordinated U.S. agency debt issued in the U.S. domestic market. Qualifying securities must have an investment grade rating (based on an average of Moody's, S&P and Fitch). In addition, qualifying securities must have at least one year remaining term to final maturity, at least 18 months to maturity at time of issuance, a fixed coupon schedule and a minimum amount outstanding of \$1 billion for sovereigns and \$250 million for agencies.
U.S. Mortgages	ICE BofA Mortgage Master	The ICE BofA US Mortgage Backed Securities Index tracks the performance of U.S. dollar-denominated fixed rate and hybrid residential mortgage pass-through securities publicly issued by U.S. agencies in the U.S. domestic market. 30-year, 20-year, 15-year and interest-only fixed rate mortgage pools are included in the Index provided they have at least one year remaining term to final maturity and a minimum amount outstanding of at least \$5 billion per generic coupon and \$250 million per production year within each generic coupon.
U.S. Corporates	ICE U.S. BofA Corp Master	The ICE BofA US Corporate Index tracks the performance of U.S. dollar-denominated investment grade corporate debt publicly issued in the U.S. domestic market. Qualifying securities must have an investment grade rating (based on an average of Moody's, S&P and Fitch), at least 18 months to final maturity at the time of issuance, at least one year remaining term to final maturity as of the rebalancing date, a fixed coupon schedule and a minimum amount outstanding of \$250 million.
USD High Yield	ICE BofA High Yield Cash Pay	The ICE BofA US Cash Pay High Yield Index tracks the performance of U.S. dollar-denominated below investment grade corporate debt, currently in a coupon paying period, that is publicly issued in the U.S. domestic market.
International Fixed Income	ICE BofA Global Broad Market TR ex USD (Hedged)	The ICE BofA Global Broad Market Excluding US Dollar Index tracks the performance of investment grade debt publicly issued in the major domestic and eurobond markets, including sovereign, quasi-government, corporate, securitized and collateralized securities, excluding all securities denominated in U.S. dollars.

Equities: Investments in equities are subject to the risks of fluctuating stock prices, which can generate investment losses. Equities have historically been more volatile than alternatives such as fixed income securities. International investments are subject to additional risks such as currency fluctuation, political instability and the potential for illiquid markets. Emerging markets bear similar but accentuated risks.

Small/Mid Cap: Stocks of small-cap and mid-cap companies pose special risks, including possible illiquidity and greater price volatility than stocks of larger, more established companies.

International: International investing involves special risks, including foreign taxation, currency risks, risks associated with possible differences in financial standards and other risks associated with future political and economic developments.

Emerging Markets: Investing in emerging markets may involve greater risks than investing in more developed countries. In addition, concentration of investments in a single region may result in greater volatility.

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