

RESEARCH

# Picking the Right Model: Risk Tolerance and Long-Term Investment Goals

September 2022

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Model portfolios streamline the process of determining an appropriate asset allocation for an investor. But which model is the right one? There are some widely accepted principles: Investors with a high risk tolerance or seeking aggressive wealth growth may prefer stocks; those with a low risk tolerance may prefer to give up the higher expected returns of stocks in exchange for the lower volatility of bonds. Many investors fall somewhere in between.

To identify a model that fits an investor's needs and preferences, it can be helpful to go beyond generalities and quantify such tradeoffs. Investors may want to know, for example, how long it would have taken a 100% equity model to recover from a market downturn vs. a model holding 60% equities and 40% fixed income (60/40), or a 100% fixed income model. To find an asset allocation that an investor can stick with, it is also useful to know how much worse a five-year performance could be for a 60/40 allocation vs. 100% fixed income or 100% equity. Finally, it is helpful to evaluate how different allocations hold up to inflation and changes in standards of living.

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In this study we examine the historical performance of different wealth-focused index models to provide financial professionals with a better understanding of all these tradeoffs.

To do so, we use the Dimensional Core Plus Wealth Index Models. The Wealth Index Models are designed to help investors assess the performance of different asset allocations over time. The Core Plus Wealth Index Models apply a strong emphasis on securities with higher expected returns by deviating from the market in pursuit of reliable equity and fixed income premiums. For the construction of the Core Plus Wealth Index Models as of December 31, 2021, see the appendix.<sup>1</sup>

## BALANCING RISK AND RETURN

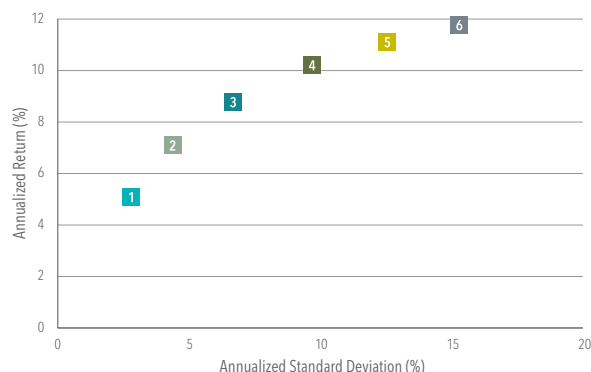
Model portfolios are often offered in a range of equity/fixed income allocations. Investors' wealth goals can range from preservation of capital to aggressive wealth growth, and the split between equities and fixed income in a portfolio is one of the most effective tools for balancing their expected risk and return.

The relative historical performance of the Dimensional Core Plus Wealth Index Models—which range from 100% fixed income to 100% equity in increments of 20%—helps to illustrate how the split between equities and fixed income can be used to find the right balance for an investor. **Exhibit 1** shows the annualized return and standard deviation of the index models over the period January 1985 to December 2021.

Not surprisingly, both realized return and volatility increase as the equity allocation increases across the models. At 20% equity and 80% fixed income, the Dimensional Core Plus 20/80 Wealth Index Model had an annualized return of 7.11% over this period, with an annualized standard deviation of 4.34%. In comparison, the Dimensional Core Plus 80/20 Wealth Index Model, composed of 80% equities and 20% fixed income, had an annualized return of 11.09%, with an annualized standard deviation of 12.51%.

Put differently, a hypothetical \$1 invested in the 20/80 model in 1985 would have grown to \$12.69 by the end of 2021, whereas it would have grown to \$48.94 had it been invested in the 80/20 model.<sup>2</sup>

EXHIBIT 1: Annualized Return and Standard Deviation, January 1985–December 2021



	Name	Annualized Return (%)	Annualized Standard Deviation* (%)
1	Dimensional Core Plus 0/100 Wealth Index Model	5.12	2.75
2	Dimensional Core Plus 20/80 Wealth Index Model	7.11	4.34
3	Dimensional Core Plus 40/60 Wealth Index Model	8.78	6.64
4	Dimensional Core Plus 60/40 Wealth Index Model	10.20	9.66
5	Dimensional Core Plus 80/20 Wealth Index Model	11.09	12.51
6	Dimensional Core Plus 100/0 Wealth Index Model	11.75	15.21

*Past performance, including hypothetical performance, does not predict future returns. Actual returns may be lower.*

\*Annualized number is presented as an approximation by multiplying the monthly number by the square root of the number of periods in a year. Please note that the number computed from annual data may differ materially from this estimate. In USD. Source: Dimensional. Indices are not available for direct investment. All performance results of the hypothetical index models are based on performance of indices with model/backtested asset allocations. The performance was achieved with the benefit of hindsight and does not represent actual investment strategies. The model's performance does not reflect advisory fees or other expenses associated with the management of an actual portfolio. There are limitations inherent in model allocations. In particular, model performance may not reflect the impact that economic and market factors may have had on the advisor's decision-making if the advisor were actually managing client money. See appendix for descriptions of the Dimensional Index Models.

1. For additional information on asset allocation, see Kaitlin Simpson Hendrix, "Dimensional's Approach to Asset Allocation," *Insights* (blog), Dimensional Fund Advisors, December 1, 2021.  
2. See appendix for additional methodology information.

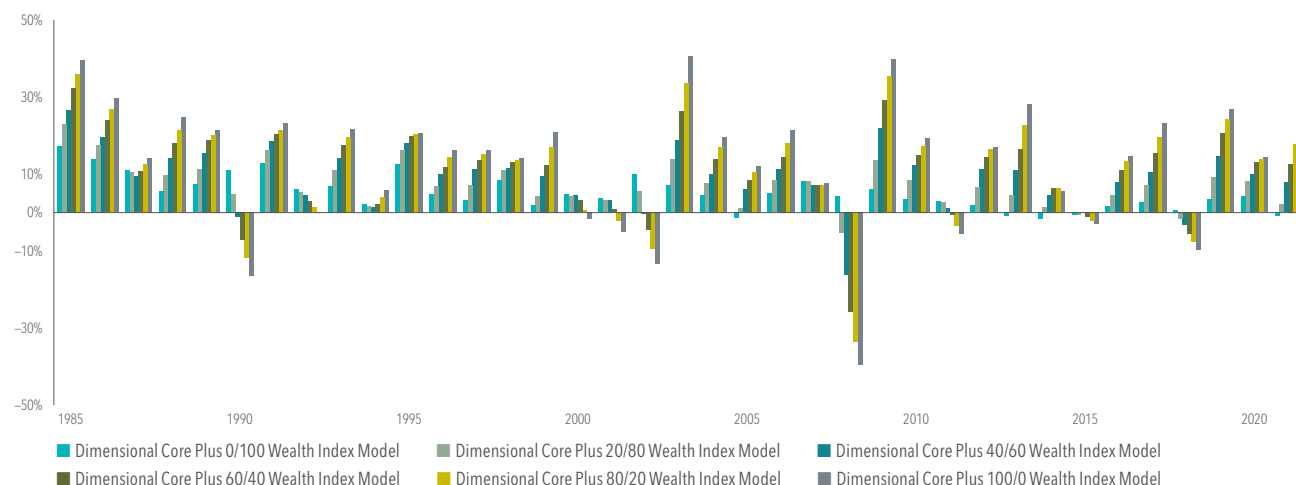
**Panel A of Exhibit 2** shows calendar-year returns for the six models over the period January 1985 to December 2021. While the models with larger allocations to equities delivered better performance in many years with strong stock market returns, they also underperformed more when equity returns were negative, leading to more year-over-year volatility in model performance. For instance, in 2008, a disappointing year for equity markets, the return to the all-equity Dimensional Core Plus 100/0 Wealth Index Model was –39.83%. Then, in a near mirror image of 2008, performance was strongly positive in 2009 with a return of 39.86%. By comparison, the all-fixed-income

Dimensional Core Plus 0/100 Wealth Index Model returned approximately 4.20% in 2008 and 6.05% in 2009.

We see a similar pattern in **Panel B** of Exhibit 2, which presents the average, best, and worst annualized rolling one-year, three-year, and five-year returns to each model. Across all time horizons, as the model weight in equity increases, the average and best performance increase. For example, the average annualized rolling five-year return to the 100% equity model was 10.11%, exceeding the average of 9.08% for the 60/40 model, which in turn exceeded the 4.84% for the all-fixed-income model.

**EXHIBIT 2: Calendar-Year Returns and Best and Worst Returns, January 1985–December 2021**

**PANEL A: Calendar-Year Returns**



*Past performance, including hypothetical performance, does not predict future returns. Actual returns may be lower.*

**PANEL B: Average, Best, and Worst**

**Annualized Rolling Returns**

	1 Year			3 Year			5 Year		
	Average Return	Best Return (Start Date)	Worst Return (Start Date)	Average Return	Best Return (Start Date)	Worst Return (Start Date)	Average Return	Best Return (Start Date)	Worst Return (Start Date)
Dimensional Core Plus 0/100 Wealth Index Model	5.16%	21.19% May-85	–3.49% Jul-14	4.92%	14.41% Mar-85	–1.24% Dec-12	4.84%	10.87% Mar-85	–0.06% Feb-12
Dimensional Core Plus 20/80 Wealth Index Model	7.16%	29.10% May-85	–11.50% Mar-08	6.69%	17.72% Mar-85	1.17% Mar-06	6.57%	14.30% Jan-85	2.08% Jan-14
Dimensional Core Plus 40/60 Wealth Index Model	8.89%	33.28% May-85	–21.40% Mar-08	8.16%	19.27% Mar-85	–3.40% Mar-06	8.01%	16.88% Jan-85	0.83% Mar-04
Dimensional Core Plus 60/40 Wealth Index Model	10.53%	46.22% Mar-09	–32.05% Mar-08	9.33%	23.10% Mar-85	–7.97% Mar-06	9.08%	20.49% Jan-85	–0.86% Mar-04
Dimensional Core Plus 80/20 Wealth Index Model	11.73%	58.57% Mar-09	–40.38% Mar-08	10.04%	26.20% May-85	–11.96% Mar-06	9.70%	23.13% Jan-85	–2.46% Mar-04
Dimensional Core Plus 100/0 Wealth Index Model	12.77%	68.97% Mar-09	–47.13% Mar-08	10.54%	29.34% May-85	–15.18% Mar-06	10.11%	25.65% Jan-85	–3.85% Mar-04

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In USD. Source: Dimensional. Indices are not available for direct investment. All performance results of the hypothetical index models are based on performance of indices with model/backtested asset allocations. The performance was achieved with the benefit of hindsight and does not represent actual investment strategies. The models' performance does not reflect advisory fees or other expenses associated with the management of an actual portfolio. There are limitations inherent in model allocations. In particular, model performance may not reflect the impact that economic and market factors may have had on the advisor's decision-making if the advisor were actually managing client money. See appendix for descriptions of the Dimensional Index Models.

On the flip side, the all-equity model experienced the most severe worst return across all time horizons.

Other aspects of risk worth considering are potential drawdowns and the length of time it may take to recover lost value. Over the period 1985 to 2021, the largest drawdown, defined as return from previous peak, for each of the six models occurred during the global financial crisis of 2008–2009. **Exhibit 3** shows the maximum drawdown, duration of peak-to-trough drop, and length of time to recover assets for each of the models during the crisis. As the equity allocation increases across the models, the drawdown was larger and time to recovery lengthened. An investor in the Dimensional Core Plus 100/0 Wealth Index Model would have seen a loss of around 54% of the value of their investment over the 16-month period ending February 2009, and it would have taken 26 months to get back to the previous peak. In contrast, an investor in the Dimensional Core Plus 40/60 Wealth Index Model would have experienced a loss of around 24% during the market downturn, and it would have taken only 10 months to recover her assets.

Making sure that the asset allocation is consistent with investors' risk tolerance can help them to stick to their investment plan during challenging times.

These results suggest that an all-equity or equity-heavy model portfolio may be appropriate for investors with a focus on growth of wealth and a high risk tolerance. For investors whose investment goal is primarily the preservation of capital or who have low risk tolerance, a model invested predominantly in fixed income securities may be the appropriate allocation. For investors with a moderate risk tolerance or who seek total returns consisting of both capital appreciation and current income, a blended asset allocation, such as 60% equity and 40% fixed income, may be fitting.

#### INFLATION AND STANDARD OF LIVING RISK

When making asset allocation decisions, investors also face inflation risk and standard of living risk. Positive nominal returns over a given period can still result in a reduction in purchasing power if those returns do not outpace inflation. Even realized returns that beat inflation can feel like a loss if they do not keep up with the change in societal standard of living, which has been positive annually on average since the 1940s in the US, as measured by personal consumption expenditure per capita. Standard of living change reflects changes in consumer preferences for the quantity, quality, and diversity of goods and services consumed over time.

**Exhibit 4** shows nominal returns, inflation-adjusted returns, and returns adjusted for both inflation and changes in the standard of living in the US for the Dimensional Core Plus Wealth Index Models over the 20-year period from 2002 through 2021. Inflation is proxied by the US Consumer Price Index and standard of living adjustments are computed using the annual change in personal consumption expenditure per capita, excluding expenditure on durable goods.

Both inflation and standard of living adjustments meaningfully chip away at an investor's return.

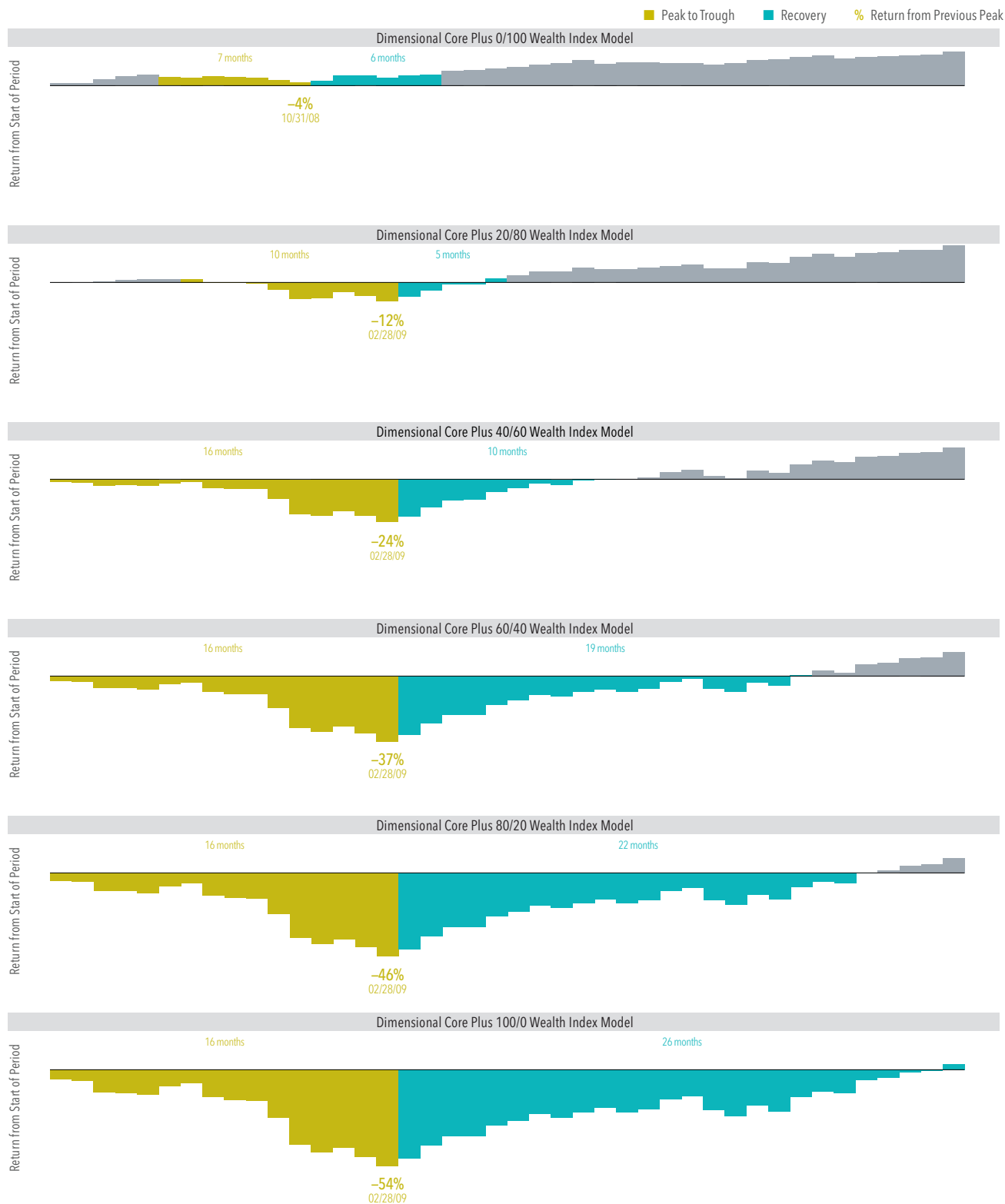
The reduction in purchasing power due to inflation is greater for equity-heavy models and lower for fixed-income-heavy models that include inflation-hedged securities. Over the past 20 years, the average annual return of the all-fixed-income model falls from 2.99% to 0.68% after adjusting for inflation, a reduction of 2.31 percentage points. By comparison, the all-equity model falls by 2.60 percentage points, from 12.06% to 9.46% when adjusted for inflation over the same period.

The impact of the standard of living adjustment is similar. For the all-fixed-income model, the average annual nominal return falls from 2.99% to an inflation- and standard of living-adjusted –0.28%. In contrast, the average annual nominal return of the all-equity model falls from 12.06% to an adjusted return of 8.52%.

As shown in Dai and Medhat (2021), equities have outpaced inflation over the long term.<sup>3</sup> This study further contributes to the literature by showing that equities have also outpaced the growth in standard of living over time. The all-fixed-income allocation, however, would not have helped investors keep up with the Joneses. It is important for investors to evaluate asset allocation decisions with inflation and standard of living risk in mind and to set expectations for long-term financial goals.

3. For more on this, see: Wei Dai and Mamdouh Medhat, "[US Inflation and Global Asset Returns](#)" (white paper, SSRN, July 13, 2021).

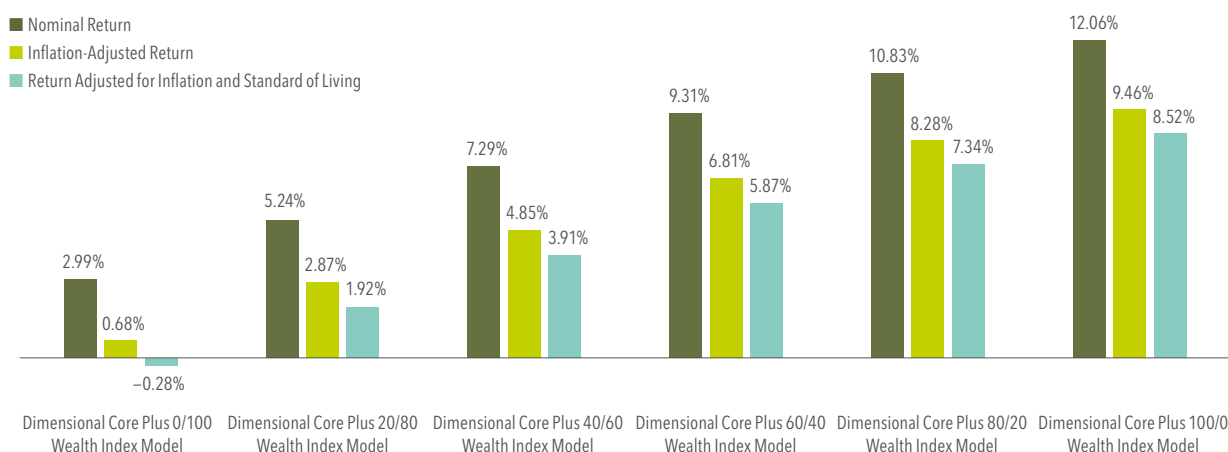
EXHIBIT 3: Maximum Drawdown and Recovery During the Global Financial Crisis, November 2007–April 2011



**Past performance, including hypothetical performance, does not predict future returns. Actual returns may be lower.**

In USD. Source: Dimensional. Indices are not available for direct investment. Performance for each Dimensional Wealth Index Model shown over the peak-to-trough period and subsequent recovery of the Dimensional Core Plus 100/0 Wealth Index Model, November 2007 to April 2011. All performance results of the hypothetical index models are based on performance of indices with model/backtested asset allocations. The performance was achieved with the benefit of hindsight and does not represent actual investment strategies. The models' performance does not reflect advisory fees or other expenses associated with the management of an actual portfolio. There are limitations inherent in model allocations. In particular, model performance may not reflect the impact that economic and market factors may have had on the advisor's decision-making if the advisor were actually managing client money. See appendix for descriptions of the Dimensional Index Models. Indices are not available for direct investment.

EXHIBIT 4: Average Annual Returns Adjusted for US Inflation and Standard of Living, 2002-2021



*Past performance, including hypothetical performance, does not predict future returns. Actual returns may be lower.*

In USD. Source: Dimensional, Federal Reserve Bank of St. Louis, and US Bureau of Labor Statistics. Inflation proxied by the US Consumer Price Index. Change in US standard of living computed using the annual change in personal consumption expenditure per capita, excluding durable goods consumption. All performance results of the hypothetical models are based on performance of indices with model/backtested asset allocations. The performance was achieved with the benefit of hindsight and does not represent actual investment strategies. The models' performance does not reflect advisory fees or other expenses associated with the management of an actual portfolio. There are limitations inherent in model allocations. In particular, model performance may not reflect the impact that economic and market factors may have had on the advisor's decision-making if the advisor were actually managing client money. See appendix for descriptions of the Dimensional Index Models. All rights reserved. Indices are not available for direct investment.

## PUTTING IT ALL TOGETHER







Picking a model portfolio with the appropriate equity/fixed income split and degree of emphasis on securities with higher expected returns may help investors stay the course during periods of high market volatility and better position them to achieve their long-term investment goals. This study helps quantify the risk-return tradeoffs across

different wealth models, examining multiple types of risk: volatility of returns, inflation risk, and standard of living risk. A better understanding of the risk-return tradeoffs of different model portfolios can empower a financial advisor to better align clients' portfolios with their risk tolerance and long-term investment goals and, as a result, provide a better investment experience.

## APPENDIX

Wealth Index Model Allocations as of December 31, 2021

### Dimensional Core Plus Wealth Index Models

						
EQUITY	0%	20%	40%	60%	80%	100%
Dimensional US Adjusted Market 2 Index	0	9	18	27	36	45
Dimensional US Large Cap High Profitability Index	0	2	5	7	9	11
Dimensional US Adjusted Market Value Index	0	2	5	7	9	11
Dimensional International Adjusted Market Index	0	3	5	8	10	13
Dimensional International Large Cap High Profitability Index	0	1	2	3	3	4
Dimensional International Vector Index	0	1	2	3	3	4
Dimensional Emerging Markets Adjusted Market Index	0	1	2	3	4	5
Dimensional Emerging Markets Value Index	0	1	2	3	4	5
S&P Global REIT Index	0	0	1	1	2	2
FIXED INCOME	100%	80%	60%	40%	20%	0%
Dimensional Short-Duration Real Return Index	20	0	0	0	0	0
Dimensional US Adjusted Investment Grade Index	0	20	20	20	0	0
Dimensional Global Short-Term Government Index (Hedged to USD)	20	0	0	0	0	0
Dimensional Global Short-Term Government Variable Maturity Index (Hedged to USD)	20	20	20	0	0	0
Dimensional Global Government/Credit 1–3 Year Unhedged Index	40	30	0	0	0	0
Dimensional Global Adjusted Fixed Income Market Index (Hedged to USD)	0	0	0	20	20	0
Dimensional Targeted Credit Index (Hedged to USD)	0	10	20	0	0	0

See "Index Descriptions" for descriptions of Dimensional index data. Indices are not available for direct investment.

### GROWTH OF WEALTH METHODOLOGY

Past performance, including hypothetical performance, is no guarantee of future results. In USD. Growth of wealth shows the growth of a hypothetical investment of \$1 in the securities in each of the Dimensional indices. Performance includes reinvestment of dividends and capital gains.

Indices are not available for direct investment; therefore, their performance does not reflect the expenses associated with the management of an actual portfolio. Index returns are not representative of actual portfolios and do not reflect costs and fees associated with an actual investment.

### Index Descriptions

Results shown during periods prior to each index's inception date do not represent actual returns of the respective index. Other periods selected may have different results, including losses. Backtested index performance is hypothetical and is provided for informational purposes only to indicate historical performance had the index been calculated over the relevant time periods. Backtested performance results assume the reinvestment of dividends and capital gains.

The Dimensional indices used in the construction of the Wealth Index Models represent academic concepts that may be used in portfolio construction. The Wealth Index Models and the indices are not available for direct investment or for use as a benchmark. The Wealth Index Model and index returns are not representative of actual portfolios and do not reflect costs and fees associated with an actual investment.

#### **DIMENSIONAL CORE PLUS 0/100 WEALTH INDEX MODEL:**

Dimensional Wealth Index Model data compiled by Dimensional. The Dimensional Core Plus 0/100 Wealth Index Model combines the following indices: Dimensional Global Short-Term Government Index (hedged to USD) (20%), Dimensional Global Government/Credit 1–3 Year Unhedged Index (40%), Dimensional Short-Duration Real Return Index (20%), and Dimensional Global Short-Term Government Variable Maturity Index (hedged to USD) (20%). The Wealth Index Model returns are calculated monthly as a weighted average of the returns of the underlying indices. The Dimensional Global Short-Term Government Index (hedged to USD) is represented by the Bloomberg US Government 1–3 Year Bond Index at 75% weight and the ICE BofA US 3-Month Treasury Bill Index at 25% weight from January 1985 to October 1992 and the Bloomberg US Government 1–2 Year Bond Index from November 1992 to January 1999. The Dimensional Global Government/Credit 1–3 Year Unhedged Index is represented by the Bloomberg US Government/Credit 1–3 Year Bond Index from January 1985 to January 1999. The Dimensional Short-Duration Real Return Index is not available back to 1985. The Dimensional Short-Duration Real Return Index is represented by the Bloomberg US TIPS Index 1–5 Years from August 1997 to October 2006. Prior to August 1997, its weight is redistributed pro rata to the other fixed income indices. The Dimensional Core Plus 0/100 Wealth Index Model has been retrospectively calculated by Dimensional and did not exist prior to March 2020.

#### **DIMENSIONAL CORE PLUS 20/80 WEALTH INDEX MODEL:**

Dimensional Wealth Index Model data compiled by Dimensional. 20% of the weight is allocated to the Dimensional Core Plus 100/0 Wealth Index Model, and 80% of the weight is allocated to the following fixed income indices: Dimensional Global Government/Credit 1–3 Year Unhedged Index (30%), Dimensional Targeted Credit Index (hedged to USD) (10%), Dimensional Global Short-Term Government Variable Maturity Index (hedged to USD) (20%), and Dimensional US Adjusted Investment Grade Index (20%). The Wealth Index Model returns are calculated monthly as a weighted average of the returns of the underlying indices. The Dimensional Global Government/Credit 1–3 Year Unhedged Index is represented by the Bloomberg US Government/Credit 1–3 Year Bond Index from January 1985 to January 1999. The Dimensional Targeted Credit Index is represented by the Bloomberg US Credit 1–3 Year Bond Index from January 1985 to January 1999. The Dimensional US Adjusted Investment Grade Index is represented by the Bloomberg US Aggregate Bond Index from January 1985 to January 1989. The Dimensional Core Plus 20/80 Wealth Index Model has been retrospectively calculated by Dimensional and did not exist prior to March 2020.

#### **DIMENSIONAL CORE PLUS 40/60 WEALTH INDEX MODEL:**

Dimensional Wealth Index Model data compiled by Dimensional. 40% of the weight is allocated to the Dimensional Core Plus 100/0 Wealth Index Model, and 60% of the weight is allocated to the following fixed income indices: Dimensional Targeted Credit Index (hedged to USD) (20%), Dimensional Global Short-Term Government Variable Maturity Index (hedged to USD) (20%), and Dimensional US Adjusted Investment Grade Index (20%). The Wealth Index Model returns are calculated monthly as a weighted average of the returns of the underlying indices. The Dimensional Targeted Credit Index is represented by the Bloomberg US Credit 1–3 Year Bond Index from January 1985 to January 1999. The Dimensional US Adjusted Investment Grade Index is represented by the Bloomberg US Aggregate Bond Index from January 1985 to January 1989. The Dimensional Core Plus 40/60 Wealth Index Model has been retrospectively calculated by Dimensional and did not exist prior to March 2020.



**DIMENSIONAL CORE PLUS 60/40 WEALTH INDEX MODEL:**

Dimensional Wealth Index Model data compiled by Dimensional. 60% of the weight is allocated to the Dimensional Core Plus 100/0 Wealth Index Model, and 40% of the weight is allocated to the following fixed income indices: Dimensional Global Adjusted Fixed Income Market Index (hedged to USD) (20%) and Dimensional US Adjusted Investment Grade Index (20%). The Wealth Index Model returns are calculated monthly as a weighted average of the returns of the underlying indices. The Dimensional Global Adjusted Fixed Income Market Index (hedged to USD) is represented by Bloomberg US Aggregate Bond Index from January 1985 to December 1989 and the Bloomberg Global Aggregate Bond Index (hedged to USD) from January 1990 to January 1999. The Dimensional Core Plus 60/40 Wealth Index Model has been retrospectively calculated by Dimensional and did not exist prior to March 2020.

**DIMENSIONAL CORE PLUS 80/20 WEALTH INDEX MODEL:**

Dimensional Wealth Index Model data compiled by Dimensional. 80% of the weight is allocated to the Dimensional Core Plus 100/0 Wealth Index Model, and 20% of the weight is allocated to the Dimensional Global Adjusted Fixed Income Market Index (hedged to USD). The Wealth Index Model returns are calculated monthly as a weighted average of the returns of the underlying indices. The Dimensional Global Adjusted Fixed Income Market Index (hedged to USD) is represented by the Bloomberg US Aggregate Bond Index from January 1985 to December 1989 and the Bloomberg Global Aggregate Bond Index (hedged to USD) from January 1990 to January 1999. The Dimensional Core Plus 80/20 Wealth Index Model has been retrospectively calculated by Dimensional and did not exist prior to March 2020.

**DIMENSIONAL CORE PLUS 100/0 WEALTH INDEX MODEL:**

Dimensional Wealth Index Model data compiled by Dimensional. The Dimensional Core Plus 100/0 Wealth Index Model combines the following indices: Dimensional US Adjusted Market 2 Index, Dimensional US Adjusted Market Value Index, Dimensional US Large Cap High Profitability Index, Dimensional International Adjusted Market Index, Dimensional International Vector Index, Dimensional International Large Cap High Profitability Index, Dimensional Emerging Markets Adjusted Market Index, Dimensional Emerging Markets Value Index, and the S&P Global REIT Index (gross dividends). The weight of the REIT index is based on the market capitalization weight of equity REITs within the global universe of eligible stocks and equity REITs, rounded to the nearest 1%. Within the remaining

non-REIT allocation, US equities are overweight relative to their market capitalization weight. The weights of the US, developed ex US, and emerging markets equities are then rescaled to sum to the total non-REIT weight of the Wealth Index Model and are all rounded to the nearest 1%.

Regional weights are rebalanced quarterly. Within the US equity allocation, each month the weights of the Dimensional US Adjusted Market 2 Index, Dimensional US Adjusted Market Value Index, and Dimensional US Large Cap High Profitability Index are 66.67%, 16.67%, and 16.67%, respectively. Within the developed ex US equity allocation, each month the weights of the Dimensional International Adjusted Market Index, Dimensional International Vector Index, and Dimensional International Large Cap High Profitability Index are 60%, 20%, and 20%, respectively. Within the emerging market equity allocation, each month the weights of the Dimensional Emerging Markets Adjusted Market Index and Dimensional Emerging Markets Value Index are equal.

The Wealth Index Model returns are calculated monthly as a weighted average of the returns of the underlying indices. The Dimensional Core Plus 100/0 Wealth Index Model has been retrospectively calculated by Dimensional and did not exist prior to March 2020.

**BLOOMBERG US CREDIT BOND INDEX 1-3 YEARS:** Data provided by Bloomberg.

**ICE BOFA US 3-MONTH TREASURY BILL INDEX:** ICE BofA index data © 2022 ICE Data Indices, LLC.

**BLOOMBERG US GOVERNMENT BOND INDEX 1-2 YEARS:** Data provided by Bloomberg.

**BLOOMBERG US TIPS INDEX 1-5 YEARS:** Data provided by Bloomberg.

**DIMENSIONAL US ADJUSTED MARKET 2 INDEX:**

January 1975–present: Compiled by Dimensional from CRSP and Compustat data. Targets all the securities in the eligible market with an emphasis on companies with smaller capitalization, lower relative price, and higher profitability, excluding those with the lowest profitability and highest relative price within the small cap universe. The index also excludes those companies with the highest asset growth within the small cap universe. Profitability is defined as operating income before depreciation and amortization minus interest expense divided by book equity. Asset growth is defined as change in total assets from the prior fiscal year to current fiscal year. The eligible market is

composed of securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market. Exclusions: non-US companies, REITs, UITs, and investment companies. The index has been retrospectively calculated by Dimensional and did not exist prior to March 2007. Accordingly, the results shown during the periods prior to March 2007 do not represent actual returns of the index. Other periods selected may have different results, including losses. The calculation methodology for the index was amended in January 2014 to include profitability as a factor in selecting securities for inclusion in the index. The calculation methodology for the index was amended in December 2019 to include asset growth as a factor in selecting securities for inclusion in the index. Prior to January 1975: Compiled by Dimensional from CRSP and Compustat data. Targets all the securities in the eligible market with an emphasis on companies with smaller capitalization and lower relative price. The eligible market is composed of securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market. Exclusions: non-US companies, REITs, UITs, and investment companies.

**DIMENSIONAL US LARGE CAP HIGH PROFITABILITY INDEX:**

Compiled by Dimensional from CRSP and Compustat data. Consists of companies with market capitalizations above the 1,000th largest company whose profitability is in the top 35% of all large cap companies after the exclusion of utilities, companies lacking financial data, and companies with negative relative price. The index emphasizes companies with lower relative price, higher profitability, and lower market capitalization. Profitability is defined as operating income before depreciation and amortization minus interest expense divided by book equity. The eligible market is composed of securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market. Exclusions: non-US companies, REITs, UITs, and investment companies. The index has been retroactively calculated by Dimensional and did not exist prior to December 2016. Accordingly, the results shown during the periods prior to December 2016 do not represent actual returns of the index. Other periods selected may have different results, including losses.

**DIMENSIONAL US ADJUSTED MARKET VALUE INDEX:**

January 1975–present: Compiled by Dimensional from CRSP and Compustat data. Targets all the securities in the eligible market, excluding securities of companies with the largest market capitalizations and highest relative price. The index emphasizes companies with smaller capitalization, lower

relative price, and higher profitability, excluding those with the lowest profitability and highest relative price within the small cap universe. The index also excludes those companies with the highest asset growth within the small cap universe. Profitability is defined as operating income before depreciation and amortization minus interest expense divided by book equity. Asset growth is defined as change in total assets from the prior fiscal year to current fiscal year. The eligible market is composed of securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market. Exclusions: non-US companies, REITs, UITs, and investment companies. The index has been retrospectively calculated by Dimensional and did not exist prior to March 2007. Accordingly, the results shown during the periods prior to March 2007 do not represent actual returns of the index. Other periods selected may have different results, including losses. The calculation methodology for the index was amended in January 2014 to include profitability as a factor in selecting securities for inclusion in the index. The calculation methodology for the index was amended in December 2019 to include asset growth as a factor in selecting securities for inclusion in the index. Prior to January 1975: Compiled by Dimensional from CRSP and Compustat data. Targets all the securities in the eligible market with an emphasis on securities with smaller capitalization and lower relative price, excluding securities with the largest market capitalizations and highest relative price. The eligible market is composed of securities of US companies traded on the NYSE, NYSE MKT (formerly AMEX), and Nasdaq Global Market. Exclusions: non-US companies, REITs, UITs, and investment companies.

**DIMENSIONAL INTERNATIONAL ADJUSTED MARKET INDEX:**

Compiled by Dimensional from Bloomberg securities data. Targets all of the securities in the eligible markets with an emphasis on companies with smaller capitalization, lower relative price, and higher profitability, excluding those with the lowest profitability and highest relative price within their country's small cap universe. The index also excludes those companies with the highest asset growth within their country's small cap universe. Profitability is defined as operating income before depreciation and amortization minus interest expense divided by book equity. Asset growth is defined as change in total assets from the prior fiscal year to current fiscal year. The index monthly returns are computed as the simple average of the monthly returns of four sub-indices, each one reconstituted once a year at the end of each quarter of the year. Maximum index weight of any one

company is capped at 5%. Countries currently included are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, and the UK. Exclusions: REITs and investment companies. The index has been retrospectively calculated by Dimensional and did not exist prior to April 2008. Accordingly, the results shown during the periods prior to April 2008 do not represent actual returns of the index. The calculation methodology for the index was amended in January 2014 to include profitability as a factor in selecting securities for inclusion in the index. The calculation methodology for the index was amended in November 2019 to include asset growth as a factor in selecting securities for inclusion in the index.

**DIMENSIONAL INTERNATIONAL LARGE CAP HIGH PROFITABILITY INDEX:**

Compiled by Dimensional from Bloomberg securities data. Consists of large cap companies with high relative price in eligible markets whose profitability is in the top 35% of their country's large cap universe, after the exclusion of utilities and companies with either negative or missing relative price data. The index emphasizes companies with lower relative price, higher profitability, and lower market capitalization. Profitability is defined as operating income before depreciation and amortization minus interest expense divided by book equity. The index monthly returns are computed as the simple average of the monthly returns of four sub-indices, each one reconstituted once a year at the end of each quarter of the year. Maximum index weight of any one company is capped at 5%. Countries currently included are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, and the UK. Exclusions: REITs and investment companies. The index has been retrospectively calculated by Dimensional and did not exist prior to December 2016. Accordingly, the results shown during the periods prior to December 2016 do not represent actual returns of the index.

**DIMENSIONAL INTERNATIONAL VECTOR INDEX:** Compiled by Dimensional from Bloomberg securities data. Targets all the securities in the eligible markets with an emphasis on companies with smaller capitalization, lower relative price, and higher profitability, excluding those with the lowest profitability and highest relative price within their country's small cap universe. The index also excludes those companies

with the highest asset growth within their country's small cap universe. Profitability is defined as operating income before depreciation and amortization minus interest expense divided by book equity. Asset growth is defined as change in total assets from the prior fiscal year to current fiscal year. The index monthly returns are computed as the simple average of the monthly returns of four sub-indices, each one reconstituted once a year at the end of each quarter of the year. Maximum index weight of any one company is capped at 5%. Countries currently included are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, and the UK. Exclusions: REITs and investment companies. The index has been retrospectively calculated by Dimensional and did not exist prior to April 2008.

Accordingly, the results shown during the periods prior to April 2008 do not represent actual returns of the index. The calculation methodology for the index was amended in January 2014 to include profitability as a factor in selecting securities for inclusion in the index. The calculation methodology for the index was amended in November 2019 to include asset growth as a factor in selecting securities for inclusion in the index.

**DIMENSIONAL EMERGING MARKETS ADJUSTED MARKET INDEX:**

Compiled by Dimensional from Bloomberg securities data. Targets all the securities in the eligible markets with an emphasis on companies with smaller capitalization, lower relative price, and higher profitability, excluding those with the lowest profitability and highest relative price within their country's small cap universe. The index also excludes those companies with the highest asset growth within their country's small cap universe. Profitability is defined as operating income before depreciation and amortization minus interest expense divided by book equity. Asset growth is defined as change in total assets from the prior fiscal year to current fiscal year. The index monthly returns are computed as the simple average of the monthly returns of four sub-indices, each one reconstituted once a year at the end of each quarter of the year. Maximum index weight of any one company is capped at 5%. Countries currently included are Brazil, Chile, China, Colombia, the Czech Republic, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, South Africa, Taiwan, Thailand, and Turkey. Exclusions: REITs and investment companies. The index has been retrospectively calculated by Dimensional and did not exist prior to April 2008. Accordingly, the results shown during

the periods prior to April 2008 do not represent actual returns of the index. The calculation methodology for the index was amended in January 2014 to include profitability as a factor in selecting securities for inclusion in the index. The calculation methodology for the index was amended in November 2019 to include asset growth as a factor in selecting securities for inclusion in the index.

**DIMENSIONAL EMERGING MARKETS VALUE INDEX:** Compiled by Dimensional from Bloomberg securities data. Consists of companies whose relative price is in the bottom 33% of their country's respective constituents, after the exclusion of utilities and companies with either negative or missing relative price data. The index emphasizes companies with smaller capitalization, lower relative price, and higher profitability, excluding those with the lowest profitability within their country's small cap universe. The index also excludes those companies with the highest asset growth within their country's small cap universe. Profitability is defined as operating income before depreciation and amortization minus interest expense divided by book equity. Asset growth is defined as change in total assets from the prior fiscal year to current fiscal year. The index monthly returns are computed as the simple average of the monthly returns of four sub-indices, each one reconstituted once a year at the end of each quarter of the year. Maximum index weight of any one company is capped at 5%. Countries currently included are Brazil, Chile, China, Colombia, the Czech Republic, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, South Africa, Taiwan, Thailand, and Turkey. Exclusions: REITs and investment companies. The index has been retrospectively calculated by Dimensional and did not exist prior to April 2008. Accordingly, the results shown during the periods prior to April 2008 do not represent actual returns of the index. The calculation methodology for the index was amended in January 2014 to include profitability as a factor in selecting securities for inclusion in the index. The calculation methodology for the index was amended in November 2019 to include asset growth as a factor in selecting securities for inclusion in the index.

**S&P GLOBAL REIT INDEX:**

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**DIMENSIONAL SHORT-DURATION REAL RETURN INDEX:**

Compiled by Dimensional using data provided by Bloomberg. Includes securities in Bloomberg US 3–5 Year Government, Credit Aaa, Aa, A, Baa indices; Bloomberg US 1–3 Year Government, Credit Aaa, Aa, A, Baa indices; Bloomberg Inflation Swap USD 2YR Zero Coupon Index (Excess Return); and Bloomberg Inflation Swap USD 5YR Zero Coupon Index (Excess Return). For the fixed income component of the index, we do the following: (1) Securities can be over- or underweighted based on government/credit spreads. When the difference in yields between credit and government bonds is narrow, government bonds may be overweighted. When the difference in yields between credit and government bonds is wide, government bonds may be underweighted. (2) Securities can be over- or underweighted with respect to their market cap weight based on credit spreads. When the difference in yields between AAA+AA and A+BBB is narrow, AAA+AA bonds may be held above market cap weight. When the difference in yields between AAA+AA and A+BBB is wide, AAA+AA bonds may be held below market cap weight. When the difference in yields between AAA+AA and BBB is narrow, BBB bonds may be held below market cap weight. When the difference in yields between AAA+AA and BBB is wide, BBB bonds may be held above market cap weight. (3) The duration of the index is based on the term spread (of real yields) between the real yields of the 3–5 year and 1–3 year credit bonds. Real yield is defined as nominal yield minus inflation swap rate. When the term spread is wide, the duration of the index can be longer than the duration of Bloomberg US Credit 1–5 Year Index. When the term spread is narrow, the duration of the index can be shorter than the duration of Bloomberg US Credit 1–5 Year Index. (4) The duration of the government component is based on the term spread (of real yields) between 3–5 year government bonds and 1–3 year government bonds. When the term spread is wide, the duration of the government component can be longer than the duration of Bloomberg US Government 1–5 Year Index. When the term spread is narrow, the duration of the index can be shorter than the duration of Bloomberg US Government 1–5 Year Index. We use the 2-year and 5-year inflation swap indices to construct an index to match the duration of the fixed income component. The Dimensional index return is the sum of the fixed income component and the inflation swap index return component. Rebalanced monthly. The index has been retrospectively calculated by Dimensional and did not exist prior to January 2020. Accordingly, results shown during the periods prior to January 2020 do not represent actual returns of the index. Other periods selected may have different results, including losses.

**DIMENSIONAL US ADJUSTED INVESTMENT GRADE INDEX:**

Compiled by Dimensional using data provided by Bloomberg. Includes securities in Bloomberg US 3–10 Year Government, Credit Aaa, Aa, A, Baa indices; and Bloomberg US 1–3 Year Government, Credit Aaa, Aa, A, Baa indices. Securities can be over- or underweighted based on government/credit spreads. When the difference in yields between credit and government bonds is narrow, government bonds may be held above 50%. When the difference in yields between credit and government bonds is wide, government bonds may be held below 50%. Securities can be over- or underweighted with respect to their market cap weight based on credit spreads. When the difference in yields between AAA+AA and A+BBB is narrow, AAA+AA bonds may be held above market cap weight. When the difference in yields between AAA+AA and A+BBB is wide, AAA+AA bonds may be held below market cap weight. When the difference in yields between AAA+AA and BBB is narrow, BBB bonds may be held below market cap weight. When the difference in yields between AAA+AA and BBB is wide, BBB bonds may be held above market cap weight. The duration of the index is based on the term spread between 5–10 year government/credit bonds and 1–3 year government/credit bonds. When the term spread is wide, the duration of the index can be longer than the duration of Bloomberg US Aggregate Index. When the term spread is narrow, the duration of the index can be shorter than the duration of Bloomberg US Aggregate Index. The duration of the government component is based on the term spread between 5–10 year government bonds and 1–3 year government bonds. When the term spread is wide, the duration of the government component can be longer than the duration of Bloomberg US Government Index. When the term spread is narrow, the duration of the index can be shorter than the duration of Bloomberg US Government Index. Rebalanced monthly. The index has been retrospectively calculated by Dimensional and did not exist prior to November 2016. Accordingly, results shown during the periods prior to November 2016 do not represent actual returns of the index. Other periods selected may have different results, including losses.

**DIMENSIONAL GLOBAL SHORT-TERM GOVERNMENT INDEX**

**(HEDGED TO USD):** Compiled by Dimensional using data provided by Bloomberg. Based on securities in the universe of Bloomberg Global Aggregate 1–2 Year Index. Includes global government bonds only. Eligible currencies: AUD, CAD, CHF, EUR, GBP, JPY, and USD. Within the eligible universe, we apply market weights to construct the index. Rebalanced monthly. The index has been retroactively calculated by Dimensional and did not exist prior to March 2020. Accordingly,

results shown during the periods prior to March 2020 do not represent actual returns of the index. Other periods selected may have different results, including losses.

**DIMENSIONAL GLOBAL SHORT-TERM GOVERNMENT VARIABLE**

**MATURITY INDEX (HEDGED TO USD):** Compiled by Dimensional using FTSE data © 2022. Includes securities in the FTSE World Government Bond 1–3 Years and 3–5 Years indices. Countries: Australia, Austria, Belgium, Canada, France, Germany, Japan, the Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, the UK, and the US. Countries with the steepest yield curves are overweight with respect to their market cap weight. For countries included, duration corresponds to the steepest segment of that country's yield curve. Rebalanced monthly. The index has been retrospectively calculated by Dimensional and did not exist prior to January 2019. Accordingly, results shown during the periods prior to January 2019 do not represent actual returns of the index. Other periods selected may have different results, including losses.

**DIMENSIONAL GLOBAL GOVERNMENT/CREDIT 1–3 YEAR**

**UNHEDGED INDEX:** February 1999–present: Compiled by Dimensional using data provided by Bloomberg. Based on securities in the universe of Bloomberg Global Aggregate Index. Includes global government bonds and global investment grade corporate bonds. Eligible currencies: AUD, CAD, CHF, EUR, GBP, JPY, and USD. Within the universe, the index identifies the yield curves that offer higher expected returns, and the duration ranges on those yield curves offering higher expected returns, and assesses the increased expected returns associated with allocation to bonds with different credit qualities. It then overweights (with respect to their market cap weight) bonds of yield curves, duration ranges, and credit qualities that offer higher expected returns. It also employs credit quality, currency, and duration requirements relative to the eligible market. Rebalanced monthly. The index has been retrospectively calculated by Dimensional and did not exist prior to January 2020. Accordingly, results shown during the periods prior to January 2020 do not represent actual returns of the index. Other periods selected may have different results, including losses. Prior to February 1999: Compiled by Dimensional using data © 2022 by FTSE. Includes securities in the FTSE World Government Bond 1–3 Years Index. Countries: Australia, Austria, Belgium, Canada, France, Germany, Japan, the Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, the UK, and the US as data becomes available. Rebalanced monthly based on market weights.

**DIMENSIONAL GLOBAL ADJUSTED FIXED INCOME MARKET INDEX**

**(HEDGED TO USD):** Compiled by Dimensional using data provided by Bloomberg. Based on securities in the universe of the Bloomberg Global Aggregate Index and Global High Yield Index. Includes global government bonds, global investment grade corporate bonds, and global BB corporates. Eligible currencies: AUD, CAD, CHF, EUR, GBP, JPY, and USD. Within the universe, the index identifies the yield curves that offer higher expected returns, and the duration ranges on those yield curves offering higher expected returns, and assesses the increased expected returns associated with allocation to bonds with different credit qualities. It then overweights (with respect to their market cap weight) bonds of yield curves, duration ranges, and credit qualities that offer higher expected returns. It also employs credit quality, currency, and duration requirements relative to the eligible market. Rebalanced monthly. The index has been retrospectively calculated by Dimensional and did not exist prior to November 2017. Accordingly, results shown during the periods prior to November 2017 do not represent actual returns of the index. Other periods selected may have different results, including losses.

**DIMENSIONAL TARGETED CREDIT INDEX (HEDGED TO USD):**

Compiled by Dimensional using data provided by Bloomberg. Based on securities in the universe of Bloomberg Global Aggregate Index and Global High Yield Index. Includes global investment grade corporate bonds and global BB corporates only. Eligible currencies: AUD, CAD, CHF, EUR, GBP, JPY, and USD. Within the universe, the index identifies the yield curves that offer higher expected returns, and the duration ranges on those yield curves offering higher expected returns, and assesses the increased expected returns associated with allocation to bonds with different credit qualities. It then overweights (with respect to their market cap weight) bonds of yield curves, duration ranges, and credit qualities that offer higher expected returns. It also employs credit quality, currency, and duration requirements relative to the eligible market. Rebalanced monthly. The index has been retrospectively calculated by Dimensional and did not exist prior to January 2020. Accordingly, results shown during the periods prior to January 2020 do not represent actual returns of the index. Other periods selected may have different results, including losses.

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