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Guiding your clients through stormy weather: Sustainable withdrawal rates in times of crisis

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- Many investors are concerned that a severe market crisis can dramatically affect their portfolio wealth and spending needs.
- This research note uses simulated market scenarios to explore the interaction among market crises, expected returns, and sustainable withdrawal rates.
- This analysis yields two insights. First, the inverse relationship between market downturns and expected returns may limit, but not eliminate, a downturn's impact on sustainable spending. And second, modest spending adjustments in response to a downturn can preserve much of a portfolio's long-term spending power.

As COVID-19 reverberated through the global economy, U.S. equity markets sustained a 35% drop in just 33 days between mid-February and mid-March. Even a diversified portfolio made up of 50% global equities and 50% global fixed income returned –19% during this period.[1]

These shocks can unsettle any investor. They can be especially unnerving to those who are already drawing retirement income from a portfolio. A retiree might ask: "How much can I safely withdraw from my portfolio during these difficult times to ensure that I can support my long-term spending needs?"

This paper helps advisors and their clients explore that question in three steps:

- First, we use the 2020 market shock as a window on the relationship between market shocks and future expected returns;
- Second, we review the mechanics of a withdrawal strategy that investors can use to safeguard a portfolio's long-term viability after a market shock;
- And third, we use Vanguard's capital market projections to simulate the long-term performance of different spending strategies before and after the 2020 market shock.

1 Calculated from Datastream market data from February 19, 2020, to March 23, 2020. U.S. equity is represented by the MSCI US Broad Market Index. International equity ex-U.S. is represented by the MSCI AC World ex US Index. U.S. fixed income is represented by the Bloomberg Barclays U.S. Aggregate Bond Index. International fixed income ex-U.S. is represented by the Bloomberg Barclays Global Aggregate ex-USD Index. Portfolio weights are: 30% domestic equity, 20% international equity, 35% domestic fixed income, and 15% international fixed income.

Lower valuations, higher expected returns

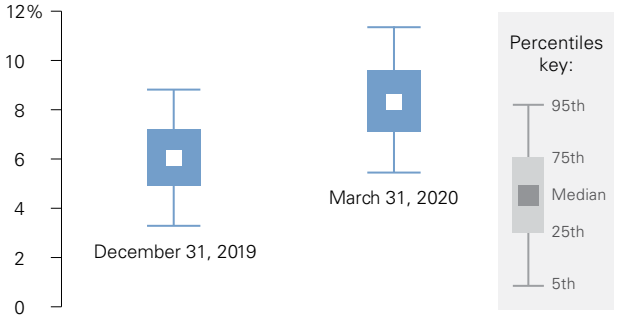
The amount that an investor can safely withdraw from a portfolio depends on the size of the portfolio and its expected returns. The larger the portfolio, and the higher the expected return, the more, on average, an investor can withdraw.

A market shock reduces the portfolio's value, diminishing the amount that can safely be withdrawn. But by lowering the valuations of securities, the shock can also raise expected returns, potentially offsetting some of this decline. A decline in stock market valuations has tended to be associated with higher future returns.[2] This relationship is subject to a lot of uncertainty, but we assume that, on average, it will hold in the future.

Vanguard models this dynamic in the Vanguard Capital Markets Model® (VCMM), a proprietary forecasting tool that provides investors with a range of possible future expected returns for a wide range of asset classes.[3,4] To highlight the potential relationship between market downturns and expected returns, we analyze two recent VCMM forecasts: the December 2019 forecast, when stock prices and valuations were higher, and the March 2020 forecast, when a sharp downturn had reduced stock valuations.

As of December 2019, the VCMM projected a range of long-term (30-year) returns for U.S. equities with a median projection of 6.1%, as illustrated in **Figure 1**. In March, following the market shock, the VCMM projected a higher range of future returns, with a median forecast of 8.3%. All returns are in nominal terms and are forecasted on a yearly basis. Please see **Figure A1** in the Appendix for the full distributions of VCMM asset class forecasts.

Figure 1. VCMM 30-year forecast for U.S. equity as of December 31, 2019, and March 31, 2020



Notes: Forecast corresponds to distribution of 10,000 VCMM simulations for 30-year annualized nominal returns as of December 31, 2019, and March 31, 2020, in USD for U.S. equity. Median return is the 50th percentile of an asset class's distribution of annual returns. See the Appendix section titled "VCMM return projections" for further details on additional asset classes not shown here.
Source: Vanguard.

In the VCMM simulations, this rise in expected returns meant that the decline in sustainable spending was shallower than the decline in the portfolio's value. At the end of December 2019, VCMM projections suggested that a $1 million portfolio could sustain $45,000 in annual spending, adjusted for inflation, for 30 years. In 10,000 simulations, the portfolio met this target 85% of the time. After the market shock, the $1 million portfolio fell to $800,000, a 20% decline. However, as expected returns rose, sustainable spending dropped by less than 10%, to $40,800. This analysis will be examined more completely later in the paper.

Of course, these projections represent probabilities, not certainties. A more certain protection against deep declines in sustainable withdrawals is adjustments to spending.

IMPORTANT: The projections and other information generated by the VCMM regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. Distribution of return outcomes from the VCMM are derived from 10,000 simulations for each modeled asset class. Simulations are as of December 31, 2019, and March 31, 2020. Results from the model may vary with each use and over time. For more information, see the Appendix section "About the Vanguard Capital Markets Model."

2 Valuations are determined by the ratio of prices to earnings. We assume that a decline in prices means a decline in valuations. If long-term business and economic fundamentals deteriorate significantly, however, this assumption would be unwarranted. We believe that, on average, current market valuations are inversely related to future expected returns.

3 A more detailed examination of the VCMM appeared in Davis, Joseph H., Roger Aliaga-Díaz, Harshdeep Ahluwalia, Frank Polanco, and Christos Tasopoulos, 2014. *Vanguard Global Capital Markets Model.* Valley Forge, Pa.: The Vanguard Group.

4 For a recent forecast see Davis, Joseph, Roger A. Aliaga-Díaz, Peter Westaway, Qian Wang, Andrew J. Patterson, Kevin DiCurcio, Alexis Gray, and Jonathan Lemco, 2019. *Vanguard Economic and Market Outlook for 2020: The New Age of Uncertainty.* Valley Forge, Pa.: The Vanguard Group.

Three spending strategies

Numerous rules have been developed to help retirees manage withdrawals from an investment portfolio. Each rule places a different emphasis on competing priorities. These priorities can include maintaining a relatively consistent spending level while preserving a portfolio's value to support future spending; bequests; and other goals.

One of the best-known rules is the "dollar plus inflation" rule. A prominent example is the 4% spending rule (Bengen, 1994[5]). Upon retirement, an investor selects the initial dollar amount to spend from the portfolio and then increases this amount by the rate of inflation each year. This rule is designed for an investor whose primary goal is spending stability. If an investor encounters an especially poor sequence of returns, however, this rule risks depleting the portfolio (Khang and Clarke, 2020[6]).

Another popular strategy is "percentage of portfolio." Investors spend a fixed percentage (rather than a dollar amount) of the portfolio each year, ensuring they never run out of money. But this rule can produce big, and perhaps intolerable, swings in the amount available for consumption. If a portfolio's value declines by 30%, spending declines by 30%. (By the same token, if it rises by 30%, spending increases by 30%.)

The "dynamic spending" rule balances the objectives of both approaches. It seeks to maintain a relatively stable spending level while preserving the portfolio's value by responding to market performance.

To implement the dynamic spending rule, a retiree would calculate each year's spending by taking a stated percentage of the prior year-end's real portfolio balance. The investor would then determine a ceiling and a floor by applying chosen percentages to the previous year's real spending amount, such as a 5% ceiling and a –1.5% floor, and compare the results.

If the new spending amount exceeds the ceiling, then spending will be limited to the ceiling amount. If it falls below the floor, spending will be maintained at the floor amount. Spending can therefore be made relatively consistent while responding to financial market performance to safeguard the portfolio's health.[7] Because outcomes are significantly affected by the selected ceiling and floor percentages, the strategy can be tailored to each retiree's goals.

Figure 2 summarizes key differences among these three spending strategies.

Figure 2. Comparing spending rules

	Dollar plus inflation	Dynamic spending	Percentage of portfolio
Market performance	Ignores	Somewhat responsive	Very responsive
Short-term spending stability	Stable	Fluctuates within limits	Unstable
Spending flexibility	Not flexible	More flexible	Highly flexible
Portfolio viability	Unpredictable	More stable	Portfolio cannot be depleted

5 Bengen, William P., 1994. Determining Withdrawal Rates Using Historical Data. *Journal of Financial Planning* (Oct.): 14–24.

6 Khang, Kevin I., and Andrew S. Clarke, 2020. *Safeguarding Retirement in a Bear Market*. Valley Forge, Pa.: The Vanguard Group.

7 For more detailed information about spending strategies, see Jaconetti, Colleen M., Michael A. DiJoseph, Francis M. Kinniry Jr., David Pakula, and Hank Lobel, 2020. *From Assets to Income: A Goals-Based Approach to Retirement Spending*. Valley Forge, Pa.: The Vanguard Group. The paper's Appendix 1 has a more detailed explanation of the dynamic spending rule.

Spending rules and market shocks

We use the December 2019 and March 2020 VCMM forecasts to explore the performance of the dollar plus inflation and the dynamic spending strategies. We exclude the percentage of portfolio approach because it can produce extreme volatility in consumption. We test these two rules using a 50% equity/50% bond portfolio with an equity home bias of 60/40 and a fixed income home bias of 70/30.

To evaluate the effectiveness of a spending rule, practitioners often rely on its probability of success—the percentage of times that a strategy sustained a given level of withdrawals through retirement without depleting the portfolio. The metric is used in historical analyses and in simulations of expected returns. In simulations, practitioners typically use 85% as a reasonable benchmark for success.

Figure 3 displays the amount of spending that could be sustained by each rule based on VCMM forecasts in December 2019 and March 2020. In the simulations, these withdrawal amounts produce an 85% probability of success.

To evaluate the market shock's impact on spending, we consider three possible scenarios:

- A base case, representing the full 10,000 VCMM scenarios;
- An optimistic scenario, made up of returns in the top 50th percentile;
- And a pessimistic scenario, made up of returns in the bottom 50th percentile.

Figure 3 shows the sustainable level of spending available to investors who follow the two spending strategies before and after the market correction.

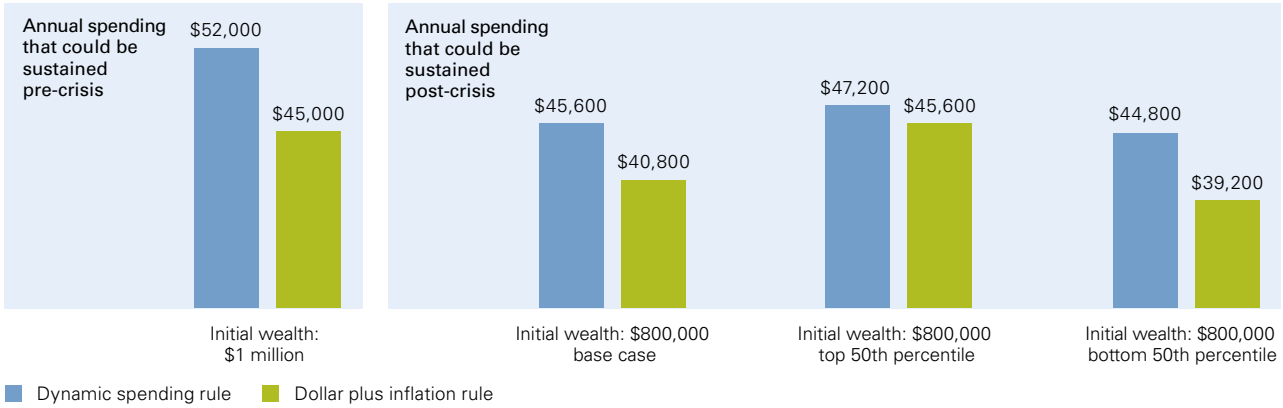
At the end of December 2019, VCMM projections suggested that a $1 million portfolio could sustain annual spending, on average, of $52,000 each year for those using the dynamic spending strategy. For those using the dollar plus inflation rule, the figure would be $45,000. Both strategies would allow an investor to support 30 years of retirement spending with an 85% success rate.

After the shock, spending for both rules declines, but it remains consistently higher for dynamic spending. Spending with the dynamic spending rule would be $45,600, versus only $40,800 for the dollar plus inflation rule. By trimming spending when returns are poor, dynamic spending preserves more of the portfolio to compound when returns are strong. In the post-shock scenarios—base case, optimistic, pessimistic—dynamic spending withdrawals exceed those of the dollar plus inflation strategy by, on average, $1,600 to $5,600 per year. Interestingly, in both the base case and the top 50th percentile scenarios, sustainable spending after the market shock is, on average, higher than the dollar plus inflation spending before the shock.

Spending targets and the two rules

Next, we examine the two rules through a different lens. Rather than fixing the probability of success at 85%, we target initial spending of $50,000 per year and evaluate the

Figure 3. Sustainable spending in times of crisis



Notes: The results assume an 85% success rate over a 30-year time horizon. The time horizon pre-crisis is 30 years after December 2019. The time horizon post-crisis is 30 years after March 2020. The ceiling is 5% and the floor is -1.5%. The asset allocation is domestic equity 30%, international equity 20%, domestic fixed income 35%, international fixed income 15%. Forecast corresponds to distribution of 10,000 VCMM simulations for 30-year annualized nominal returns as of December 31, 2019, and March 31, 2020, in USD. See the Appendix section "Index simulations" for further details on asset classes shown here.

Source: Vanguard.

probability that the portfolio will finish the 30-year period with a positive account balance. Note that in the dynamic spending simulation, the $50,000 target is for the first year only, as this strategy implies a willingness to deviate from this target. A dollar plus inflation rule, by contrast, pulls an inflation-adjusted $50,000 from the portfolio year after year. **Figure 4** displays each rule's probability of success.

Again, the dynamic spending strategy's flexibility gives an investor a better chance of success than the dollar plus inflation approach. Pre-crisis, a $1 million portfolio, combined with a first-year spending target of $50,000, had a 91.4% probability of surviving the 30-year period for those following the dynamic spending method and a 65.8% probability of success for the dollar plus inflation method.

After the market shock, the probability of success for dynamic spending drops from 91.4% to 66.2% under the base case projection. For dollar plus inflation, the rate falls by much more: from 65.8% to 35.8%.

The initial target of $50,000 is aggressive, and the relatively low probabilities for both rules after the shock are unsurprising. In **Figure 5**, we evaluate both spending rules with a more conservative $40,000 spending target.

The probabilities for both improve, but again, the rates are significantly higher for dynamic spending. Post-crisis, the probability of success for dynamic spending would be 97.8%, versus only 88.6% for the dollar plus inflation strategy.

Figure 4. Probability of success in times of crisis with $50,000 spending target

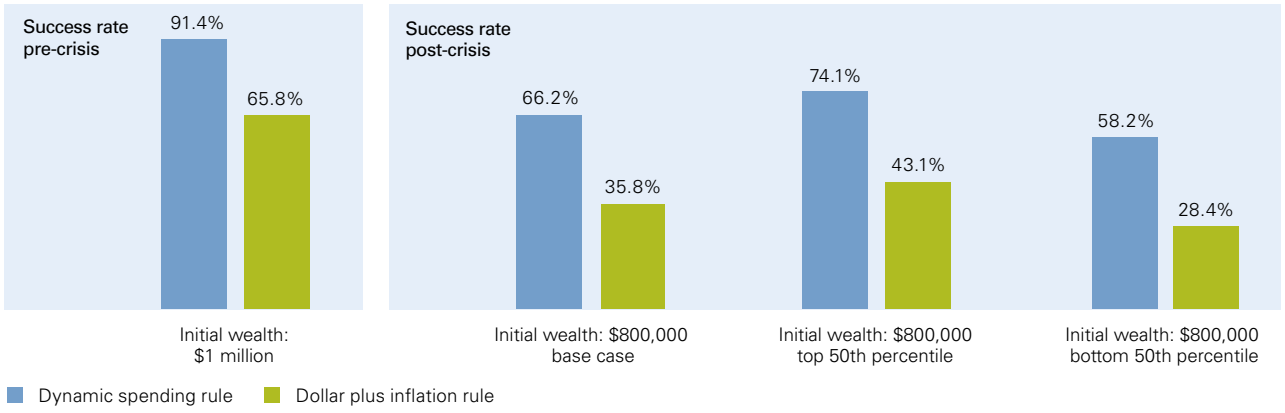
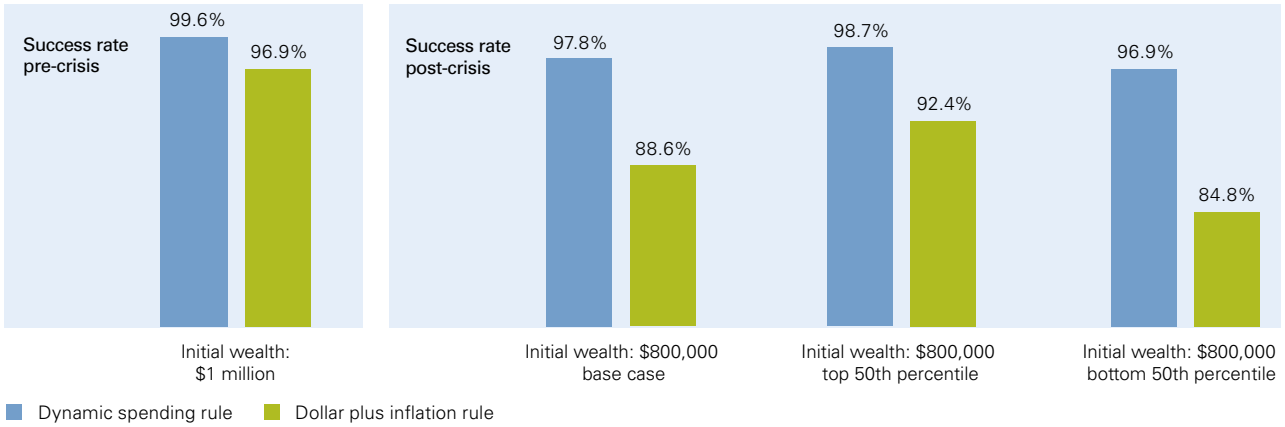


Figure 5. Probability of success in times of crisis with $40,000 spending target



Notes: The results assume a starting withdrawal of $50,000. The time horizon pre-crisis is 30 years after December 2019. The time horizon post-crisis is 30 years after March 2020. The ceiling is 5% and the floor is -1.5%. Asset allocation is domestic equity 30%, international equity 20%, domestic fixed income 35%, international fixed income 15%. Forecast corresponds to distribution of 10,000 VCMM simulations for 30-year annualized nominal returns as of December 31, 2019, and March 31, 2020, in USD. See the Appendix section "Index simulations" for further details on asset classes shown here.

Source: Vanguard.

Conclusion

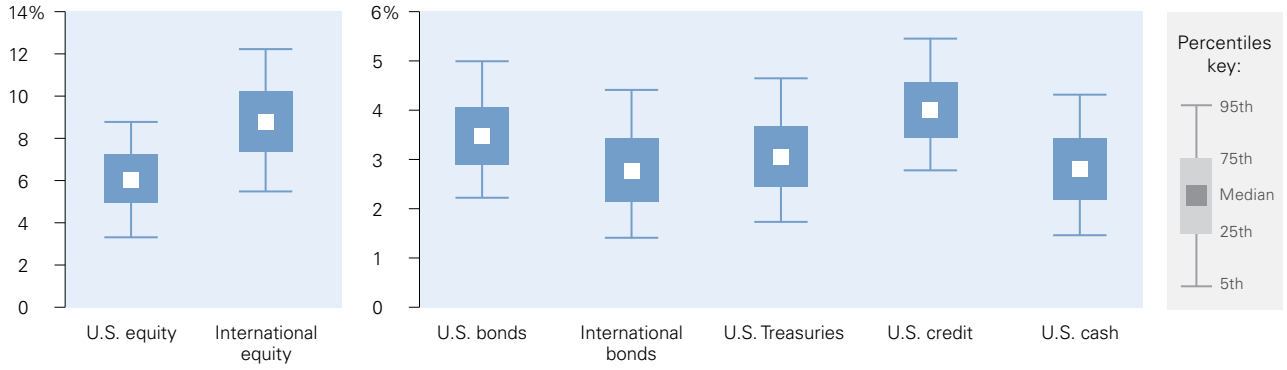
Market shocks are unsettling, but their impact on retirement spending can be managed. On average, a decline in market valuations has been associated with a rise in expected returns. This can help offset some of the damage to sustainable withdrawal rates. A dynamic spending strategy can position a portfolio to benefit from these potentially higher returns and protect a portfolio's long-term spending power.

Appendix. VCMM return projections

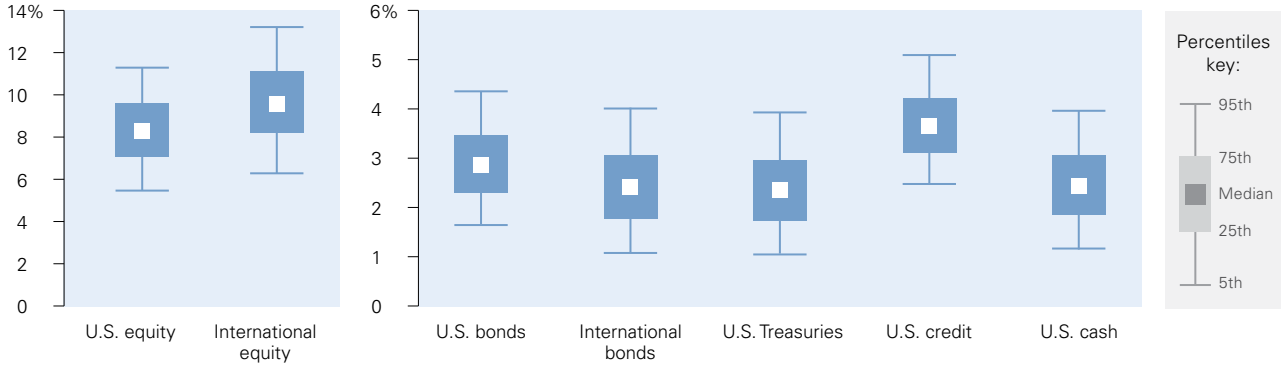
Vanguard's forward-looking expectations are for key asset classes as of December 2019 and March 2020. Because of the drop in equity prices between these two quarters, forward-looking valuations have increased, leading to an increase in future expected returns. Vanguard's VCMM forecast is presented as a distributional framework.

Figure A1. The March 2020 drop in stock prices lifted forward-looking return expectations

a. 30-year VCMM forecast as of December 2019



b. 30-year VCMM forecast as of March 2020



Notes: Forecast corresponds to distribution of 10,000 VCMM simulations for 30-year annualized nominal returns as of December 31, 2019, and March 31, 2020, in USD for asset classes shown. Median return is the 50th percentile of an asset class's distribution of annual returns. See the Appendix section titled "Index simulations" for further details on the asset classes shown here. U.S. equities are represented by the MSCI US Broad Market Index; global ex-U.S. equities by the MSCI All Country World ex USA Index; U.S. bonds by the Bloomberg Barclays U.S. Aggregate Bond Index; global ex-U.S. bonds by the Bloomberg Barclays Global Aggregate ex-USD Index; U.S. Treasury bonds by the Bloomberg Barclays U.S. Treasury Index; U.S. credit bonds by the Bloomberg Barclays U.S. Credit Bond Index; and U.S. cash by the U.S. 3-Month Treasury—constant maturity rate.

Source: Vanguard.

About the Vanguard Capital Markets Model

IMPORTANT: The projections and other information generated by the Vanguard Capital Markets Model regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. VCMM results will vary with each use and over time.

The VCMM projections are based on a statistical analysis of historical data. Future returns may behave differently from the historical patterns captured in the VCMM. More important, the VCMM may be underestimating extreme negative scenarios unobserved in the historical period on which the model estimation is based.

The Vanguard Capital Markets Model® is a proprietary financial simulation tool developed and maintained by Vanguard's primary investment research and advice teams. The model forecasts distributions of future returns for a wide array of broad asset classes. Those asset classes include U.S. and international equity markets, several maturities of the U.S. Treasury and corporate fixed income markets, international fixed income markets, U.S. money markets, commodities, and certain alternative investment strategies. The theoretical and empirical foundation for the Vanguard Capital Markets Model is that the returns of various asset classes reflect the compensation investors require for bearing different types of systematic risk (beta). At the core of the model are estimates of the dynamic statistical relationship between risk factors and asset returns, obtained from statistical analysis based on available monthly financial and economic data from as early as 1960. Using a system of estimated equations, the model then applies a Monte Carlo simulation method to project the estimated interrelationships among risk factors and asset classes as well as uncertainty and randomness over time. The model generates a large set of simulated outcomes for each asset class over several time horizons. Forecasts are obtained by computing measures of central tendency in these simulations. Results produced by the tool will vary with each use and over time.

Index simulations

The long-term returns of our hypothetical portfolios are based on data for the appropriate market indexes as of December 31, 2019, and March 31, 2020. The asset classes and their representative forecast indexes are as follows:

U.S. equities: MSCI US Broad Market Index

Global ex-U.S. equities: MSCI All Country World ex USA Index

U.S. bonds: Bloomberg Barclays U.S. Aggregate Bond Index

Global ex-U.S. bonds: Bloomberg Barclays Global Aggregate ex-USD Index

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Past performance is no guarantee of future returns. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

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