US Wealth Management
U.S. Bancorp Investments

Methodology and Assumptions

Monte Carlo Simulations

Monte Carlo simulations are a widely used statistical modeling technique that helps forecast a set of potential future outcomes based on the asset allocation choices and underlying assumptions regarding rates of return for a model portfolio. They are used to illustrate return scenarios and managed asset outcome projections.

Portfolios are created based on each investor's inputs, taking into account the investor's current age, risk tolerance, goal type, current goal balance, and time horizon[i].

The Automated Investor portfolios used in the Monte Carlo simulations consist of ETFs in each asset class that best reflect that particular asset class' risk and return characteristics.

Items to note regarding the illustrative performance chart for the Monte Carlo simulation:

- Projected growth rate and the projected total value of the portfolio are based on the 50th percentile performance results of 6,000 scenarios.
- The 50th percentile performance outcome is a projection for which 50% of all the simulations resulted in a lower or equal projected return and 50% resulted in a higher projected return.
- When displayed graphically, the upper end of the range is the 85th percentile outcome and the lower end of the range is the 15th percentile outcome.
- The projected growth rate and the projected total value of the portfolio are not adjusted for inflation.
- The simulation runs over a maximum investment horizon of 50 years.
- The outcomes presented represent only a few of the many possible outcomes.
- These simulated outcomes are not guarantees of investment return.

For the Automated Investor Service, managed asset projections assume quarterly rebalancing, are net of fund expenses, and are net of the annual advisory fee. Taxes are not considered in these projections.

All projections as part of the portfolio analysis feature are based on the investor's target portfolio, assume quarterly rebalancing, and are net of fund expenses but do not take into account management fees, commission fees, taxes or other miscellaneous fees and expenses that could be incurred through other investment management or brokerage services. If included, these would reduce the portfolio's performance.

Differences in account size, time horizon, risk tolerance, goal type, timing of transactions and market conditions at the time of investment may lead to different results than projected.

Capital Market Assumptions (As of 6/26/2019)

The Capital Market Assumptions refer to our return expectations, volatility of returns, and how asset classes move in relation to each other (correlation). These assumptions are based on historical asset class returns (as reflected by certain indexes), proprietary models, our subjective assessments of the current market environment and forecasts of the likelihood of future events. The Capital Market Assumptions are used to construct the model portfolios for both the Monte Carlo projections as well as investment model components for each asset class.

Indexes are used to illustrate each asset class, although the index itself may not be investable.

INDEX	ASSET CLASS	Annual Expected Return	Annual Expected Risk
S&P 500 TR USD	Large Cap U.S. Equity	8.41%	15.50%
MSCI EAFE GR USD	Developed Markets Equity	9.11%	17.16%
MSCI EM GR USD	Emerging Markets Equity	10.80%	23.80%
Barclays US Aggregate Bond TR USD	Investment Grade	3.24%	4.72%

INDEX	ASSET CLASS	Annual Expected Return	Annual Expected Risk
Barclays Municipal TR USD	Municipal	2.66%	4.97%
Barclays US Treasury US TIPS TR USD	Inflation Protected (TIPs)	3.22%	6.30%
BofAML US HY Master II TR USD	High Yield	5.09%	8.40%
Barclays Global Aggregate Ex US TR US	Foreign Developed Debt	0.84%	8.30%
JPM EMBI Global TR USD	Foreign Emerging Debt	5.00%	10.85%
Dow Jones US Select RE TR USD	U.S. Listed Real Estate	7.42%	19.18%
S&P Developed ex US REIT GR USD	Foreign Listed Real Estate	7.58%	15.97%
(N/A)	Cash	2.61%	0.50%

- We typically review the assumptions annually.
- Long-term capital market assumptions are subject to high levels of uncertainty regarding future economic and market factors that may affect actual future performance.
- There is no guarantee that the Capital Market Assumptions will be achieved, and actual returns could be significantly higher or lower than those shown.
- The Capital Market Assumptions should not be relied on as a forecast or prediction of future events and are not guarantees of future returns from any investment or asset class described here.
- The value of these assumptions is in their ability to capture relevant relationships and changes in those relationships resulting from economic and market influences.

Indexes are unmanaged and one cannot invest directly in an index.

- **The S&P 500 Index** consists of 500 widely traded stocks that are considered to represent the performance of the U.S. stock market in general.
- **The MSCI EAFE Index** measures the equity market performance of developed markets outside of the U.S. & Canada. The index includes approximately 1,000 companies representing the stock markets of 21 countries in Europe, Australasia and the Far East (EAFE).
- **The MSCI EM Index** is designed to measure equity market performance in the global emerging markets.
- **The Bloomberg Barclays Bond U.S. Aggregate Index** measures taxable investment-grade U.S. domiciled fixed-rate debt issues, including government, corporate, asset-backed, and mortgage backed securities, with maturities of one year or more.
- **The Barclays US Treasury US TIPS Index** measures all publicly issued, U.S. Treasury inflation-protected securities that have at least one year remaining to maturity, are rated investment grade, and have $250 million or more of outstanding face value.
- **The Bloomberg Barclays Capital U.S. Insured Municipal Bond Index** measures investment-grade U.S. domiciled municipal bonds with maturities of one year or more.
- **The BofAML US HY Master II Index** measures all high yield domestic bonds and bonds issued in the U.S. by a foreign entity that are dollar denominated with maturities of one year or more and a credit rating lower than BBB-/Baa3, but are not in default.
- **The Bloomberg Barclays Global Aggregate ex-U.S. Dollar (USD) Index** is considered to be representative of bonds of foreign countries.
- **The J.P. Morgan Emerging Markets Bond Index Global** tracks total returns for traded external debt instruments in the emerging markets.
- **The Dow Jones U.S. Select REIT Index** measures the performance of publicly traded REITs (Real Estate Investment Trusts) in the U.S. and is a proxy for direct real estate investment, in part by excluding companies whose performance may be driven by factors other than the value of real estate.
- **The S&P Global Ex-U.S. Property Index** measures the investable universe of publicly traded property companies domiciled in developed and emerging markets excluding the U.S. The companies included are engaged in real estate related activities such as property ownership, management, development, rental and investment. excluding the U.S. The companies included are engaged in real estate related activities such as property ownership, management, development, rental and investment.

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Tax Loss Harvesting Analysis

The Automated Investor Service tax-loss harvesting strategy enables U.S. taxpayers to potentially offset capital gains with capital losses with the goal of reducing federal and state income tax obligations. Compounding this annual return over time could potentially mean a significant amount of additional income.

Portfolio Risk

The portfolio analysis feature analyzes the investor's current portfolio risk by estimating its annualized volatility, or the measure of how much the portfolio value could vary over a year. This is done at the asset allocation level, it does not take into account security-specific information. The inputs used in the analysis are the investor's current portfolio allocation, assumed annual volatilities per asset class and assumed correlations between asset class returns.

In order to compare the current risk level to target portfolio risk levels, the portfolio analysis feature also estimates the annualized volatilities of the target portfolios at each risk tolerance level. It uses the target portfolio allocation as an input; the calculation is otherwise the same as the investor's current portfolio risk. The target portfolio risk level is the annualized volatility of the target portfolio.

In order to determine whether an investor's portfolio is considered "on track" or "off track", the portfolio analysis feature computes the absolute difference between investor's current portfolio volatility and the annualized volatility of the target portfolio at each risk tolerance level. The target portfolios used for comparison are selected based on the investor's time horizon[i]. The risk level associated with the lowest absolute difference is the current risk level.

An investor's portfolio is considered "off track" if: (i) the investor's current risk level is different from the investor's target risk level; or (ii) the investor's portfolio volatility is more than 1% higher than the volatility of the aggressive target portfolio; (iii) or the investor's portfolio volatility is more than 1% lower than the volatility of the conservative target portfolio. Otherwise, the investor is considered "on track".

Asset Allocation

To determine whether the investor's current allocation provides a satisfactory level of expected return, the portfolio analysis feature employs a scoring method to compare the asset allocation of their current holdings with that of the target portfolio.

Uninvested Cash

The portfolio analysis feature identifies any cash (currency or cash equivalent securities) held within aggregated or manually reported accounts. We take the sum of cash across all accounts in the portfolio and apply the Monte Carlo simulation methodology to estimate how the idle cash might grow if invested. Uninvested cash is assumed to grow at an annual rate as determined by the Capital Market Assumptions.

Fund Fees

The portfolio analysis feature estimates the annual amount the investor is currently paying in fund fees. This does not include trade commissions, loads, or redemption fees. The estimated annual fee amount is then compared to the annual fund fees the investor would incur if they invested entirely in the target portfolio.

The Bottom Line - “Portfolio Health”

An investor’s portfolio “health” is the dollar difference between current and target portfolio projections. This projected performance is not based on any actual securities held in the investor’s current or target portfolio. We use the Monte Carlo simulation, based on the expected returns of the applicable asset classes in an investor’s current and target portfolios, net of estimated fund fees.

DISCLOSURES:

There is no assurance that an investment mix or any performance shown on the Automated Investor will lead to the expected results shown or perform in any predictable manner. The validity of the analysis generated is in part dependent upon the accuracy of the data entered by the investor.

In both the portfolio analysis feature and Automated Investor Services, since past performance and market conditions are no guarantee of future results, investment goals may not be fulfilled by following guidance based on the projections. Actual investment outcomes may vary.

Because of the inherent limitations associated with the use of illustrative portfolios based on capital markets assumptions, you should not rely exclusively on the asset allocations, portfolios or funds shown in the Automated Investor Service when making an investment decision.

If you have any questions or concerns, contact us to consult with an investment professional at (866) 758-8655. The illustrative portfolios cannot account for the impact that economic, market, and other factors may have on an actual investment portfolio. Unlike actual portfolios, the asset allocations shown in the Automated Investor Service do not reflect actual trading, liquidity constraints, fees, expenses, taxes and other factors that could impact your realized future returns.

The Automated Investor Service's automatic tax-loss harvesting should not be interpreted as tax advice and there is no representation that the tax consequences detailed will be obtained or that the tax-loss harvesting strategy will result in any particular tax outcome. Investors should consult with their personal tax advisors regarding the tax consequences of investing through the Automated Investor Service and engaging in this tax-loss harvesting strategy, based on their particular circumstances. The Automated Investor Service assumes no responsibility for the tax consequences to any investor of any transaction.

Diversification and asset allocation strategies do not guarantee low volatility, profit or protection against loss.

Past performance is no guarantee of future results.

[i] Time horizon applies differently for each goal. For Major Purchase goal, we assume a liquidation occurs at the end of the time horizon, however for the General Investing goal, we do not assume a liquidation will occur at the end of the time horizon. For the Retirement goal, we do not use a time horizon, but instead we assume retirement begins at the end of the investment period, based on the retirement date that is provided by the investor.

A portfolio analysis is a free financial education feature offered through U.S. Bancorp Investments as broker-dealer. Users of the portfolio analysis feature should understand that if they choose to implement the education, they will incur additional costs and expenses associated with investing, including the underlying fees and expenses of the funds in which they invest, trading costs and taxable gains/losses associated with their investments.

Automated Investor is a U.S. Bancorp Investments advisory program. Investment products and services are available through U.S. Bancorp Investments, the marketing name for U.S. Bancorp Investments, Inc., member FINRA and SIPC, an investment adviser and brokerage subsidiary of U.S. Bancorp and affiliate of U.S. Bank. U.S. Bank is not responsible for and does not guarantee products,

IMPORTANT: The projections or other information generated by Automated Investor regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results and are not guarantees of future results. Results may vary with each use and over time.

Investing involves risk, including possible loss of principal.

Past performance is not indicative of future results. The tax loss harvesting and other tax strategies discussed should not be interpreted as tax advice and there is no representation that such strategies will result in any particular tax consequence. Users should consult with their personal tax advisors regarding the tax consequences of investing.

Tax-efficient investing is designed to help optimize your portfolio by allocating less tax-efficient assets to tax-advantaged accounts.

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For investment and market commentary pieces

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