



Balancing Risk and Reward

CHOOSING THE RIGHT MIX FOR YOUR PORTFOLIO

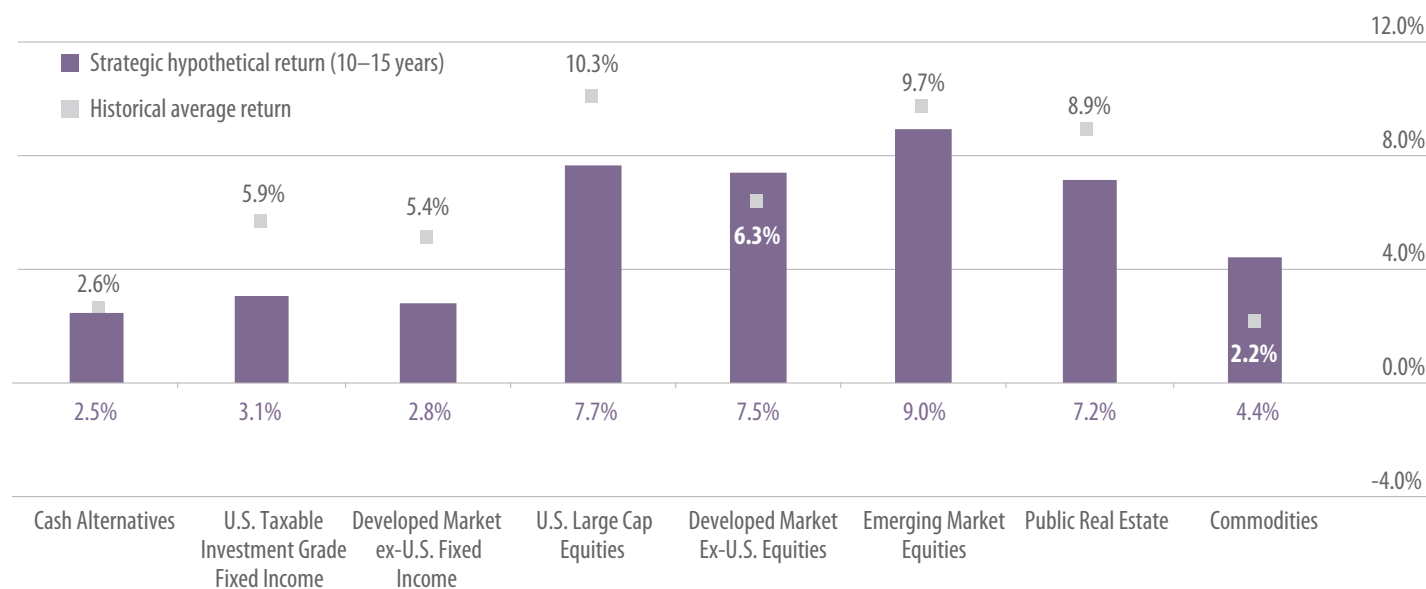
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Aligning risk with expected return

Market participants must weigh the amount of risk they are willing to take in exchange for return or income. When asset prices begin to rise ahead of fundamental valuation measures, we believe that investors should exercise greater caution. That is because history shows that overvaluation is eventually corrected. Today, we believe that most markets are fairly valued given attractive future earnings growth potential—although we expect higher volatility to persist. In the coming years, we expect that returns for most asset classes will be lower than their historical average returns. We recommend maintaining a diversified portfolio with a level of expected risk that aligns with an investor's return objectives.

Expect lower returns in the future

We are forecasting that most asset classes will have generally lower returns over the next 10 to 15 years than their historical averages.



Sources: FactSet, Morningstar Direct, and Wells Fargo Investment Institute forecasts, as of December 31, 2017

Cash alternatives: Bloomberg Barclays 1–3 Month Treasury Bill Index; **U.S. taxable investment grade fixed income:** Bloomberg Barclays U.S. Aggregate Bond Index; **developed market ex-U.S. fixed income:** J.P. Morgan GBI Global ex-U.S. Index; **U.S. large cap equities:** S&P 500 Index; **developed market ex-U.S. equities:** MSCI EAFE Index; **emerging market equities:** MSCI Emerging Markets Index; **public real estate:** FTSE EPRA/NAREIT Developed Index; **commodities:** Bloomberg Commodity Index.

The average return is calculated using historical monthly returns from 1991 to 2017. The same methodology is used for calculating historical performance. Strategic (10– to 15-year) hypothetical returns are forward-looking estimates from Wells Fargo Investment Institute of how asset classes and combinations of classes may respond during various market environments. Hypothetical returns do not represent the returns that an investor should expect in any particular year. They are not designed to predict actual performance and may differ greatly from actual performance. They are based on estimates and assumptions that may not occur. An index is unmanaged and not available for direct investment. **Hypothetical performance and past performance are no guarantee of future results.** Please see pages 14 and 15 for the definitions of the indices and risks associated with the representative asset classes.

Investment and Insurance Products: NOT FDIC Insured ► NO Bank Guarantee ► MAY Lose Value

Balancing risk and reward

Investing involves taking calculated risks in exchange for expected gains. The challenge for investors is to accurately identify risks and potential rewards from various assets and assemble them into a portfolio that seeks to deliver the expected results over time. Historically, assets that provide steady streams of income, backed by reliable sources of repayment, have tended to be less risky than assets that provide inconsistent (or no) income with less reliable sources of repayment.

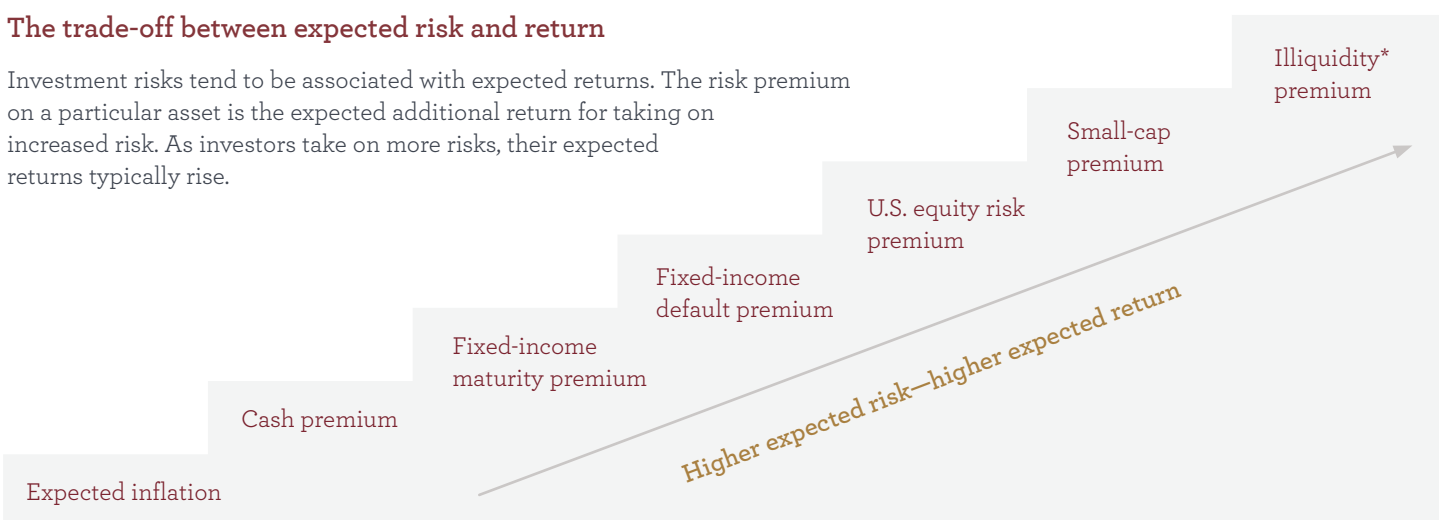
We believe a long-lived bull market and relatively low volatility can lull investors into taking on greater levels of risk for potentially lower expected returns. The recent resurgence in market volatility likely revealed that some investors had taken on more risk than they anticipated. In this report, we explore the different types of investment risk and how investors can assemble portfolios that suit their risk tolerance. We also examine potential investment rewards that extend beyond return.

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The trade-off between expected risk and return

Investment risks tend to be associated with expected returns. The risk premium on a particular asset is the expected additional return for taking on increased risk. As investors take on more risks, their expected returns typically rise.



Source: Wells Fargo Investment Institute, 2017. This chart is conceptual and does not reflect any actual returns or represent any specific asset classifications

*Illiquid investments are those that are not readily convertible to cash.

Key questions addressed in this report

What potential risks are investors facing at this stage in the economic cycle?

How do psychology and emotions influence investor behavior during market fluctuations?

How can investors assess their risk tolerance and set their risk budget?

How can diversification help mitigate risks?

IN SEARCH OF REWARD

Lower yields after the Great Recession resulted in capital appreciation becoming a greater percentage of U.S. bond returns.

14.6%

The capital appreciation contribution to U.S. bonds' total returns from 1996 through 2007

35.9%

The capital appreciation contribution to U.S. bonds' total returns from 2007 through 2017

Source: Bloomberg, yearly returns of the Bloomberg Barclays U.S. Aggregate Bond Index from 1996 through 2007 and from 2007 through 2017

Investor rewards can go beyond total return

The primary reward that many investors pursue is return on their investments. However, investors often seek other rewards, such as income generation, the potential for downside protection, liquidity, tax mitigation, or furthering a social or environmental cause.

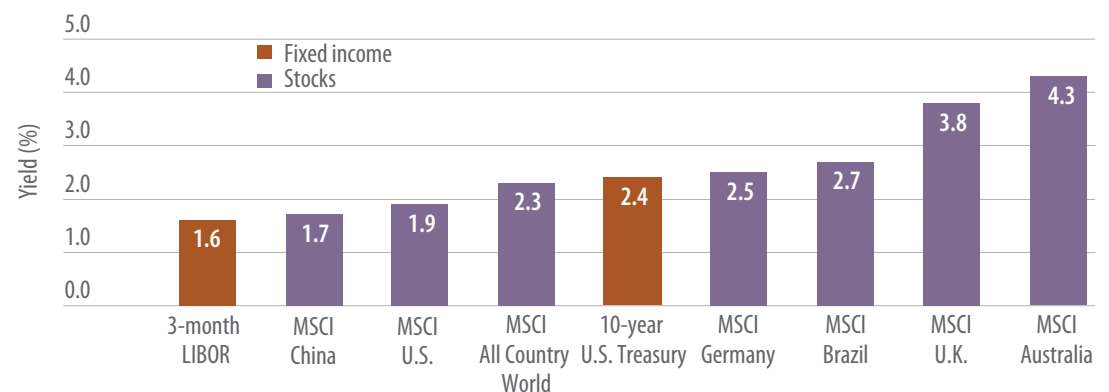
Return: In general, the total return of an asset class comes from two sources: capital appreciation, such as stock price movements, and income, such as coupon payments from bonds or dividend payments from equities. Investors often associate investment-grade bonds with more predictable income returns. However, an increase in monetary easing following the Great Recession reduced yields on many types of bonds to levels that have been more comparable with dividend yields for equities.

Income generation: Bond yield spreads have compressed in recent years, meaning that the extra return for taking on credit and duration risk has diminished.* Investors' reach for yield has therefore extended into dividend-paying stocks, real estate investment trusts (REITs), and master limited partnerships. However, dividend yields are not a direct replacement for bond income, due to the difference in risk and payment obligations between equities and bonds.

*Duration risk is the risk associated with the sensitivity of a bond's price to a 1% change in interest rates.

Dividend yields compared with high-quality bond yields

Dividend yields in many stock markets are higher than the yields on high-quality U.S. bonds. Stocks tend to carry more risk than bonds, though, and investors should make sure their asset allocations align with their risk tolerance.



Sources: FactSet and Wells Fargo Investment Institute, as of December 31, 2017. Yields represent past performance. **Past performance is no guarantee of future results.**

Yields may be lower or higher than that quoted above. Yields fluctuate as market conditions change. An index is unmanaged and not available for direct investment. Cash is represented by 3-month LIBOR, and sovereign bond yields are represented by the 10-year U.S. Treasury yield. The LIBOR USD 3-month rate is an average derived from the quotations provided by the banks determined by the ICE Benchmark Administration.

Note: The MSCI Developed- and Emerging-Market Country indices are designed to measure the performance of the large- and mid-cap segments of the individual country markets and cover approximately 85% of the free-float-adjusted equity universe in each country. The MSCI All Country World Index is a market-capitalization-weighted index designed to provide a broad measure of equity-market performance throughout the world. It consists of 46 country indices comprising 23 developed and 23 emerging-market countries.

Downside protection: Some investors prefer to hold assets whose range of returns is relatively narrow. The price paid for potential downside protection is typically lower returns. Yet, there is one way to seek to mitigate risk without necessarily giving up return—through diversification. Holding a mix of assets that do not always move in the same direction can result in lower risk for a given level of return.*

Liquidity: Investors may value having the option to liquidate their portfolios on the public markets within a short period. In general, relatively liquid assets are expected to have lower returns compared with less liquid assets.

Tax mitigation: Certain asset classes may offer investors tax-advantaged income. For example, interest on municipal bonds is currently tax-exempt at the federal level. These bonds also may be exempt from state taxes.

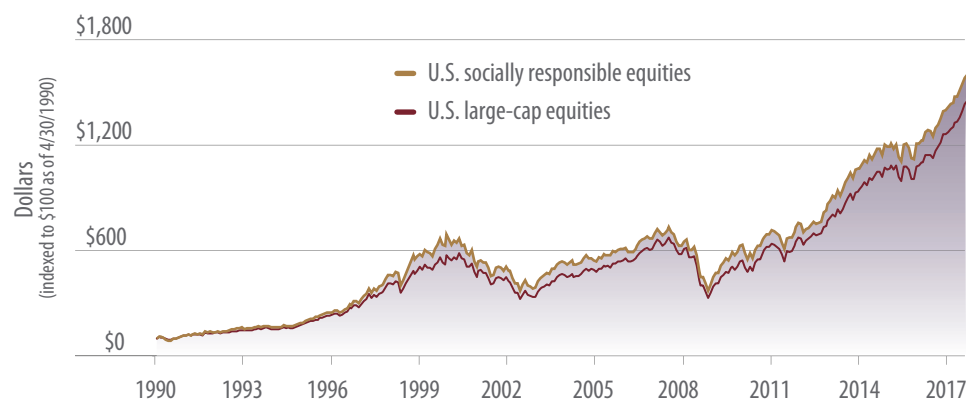
Furthering a social or environmental cause: Investors may wish to contribute to social causes that are important to them. Social impact investing (SII) may offer opportunities to invest in green technologies or minority-owned firms.

*Diversification is an investment method used to help manage risk. It does not ensure a profit or protect against a loss. All investing involves risks, including the possible loss of principal.

Key takeaways

- Total return is perhaps the most popular reward that investors pursue—but far from the only one.
- Other investment rewards include income generation, potential downside protection, liquidity, tax mitigation, and social impact.
- Ideally, a portfolio allocation would maximize an investor's reward for a given level of risk.

SII and traditional U.S. equity strategies have performed similarly



Source: Bloomberg, as of December 31, 2017. Monthly data, assumes \$100 was invested on April 30, 1990. U.S. socially responsible equities represented by the MSCI KLD 400 Index and U.S. large-cap equities represented by the S&P 500 Index.

The MSCI KLD 400 Social Index includes 400 companies with high ESG ratings relative to the constituents in the MSCI USA Investable Market Index (IMI) while maintaining sector weights similar to the MSCI USA IMI. The index excludes companies with significant business activities involving alcohol, tobacco, firearms, gambling, nuclear power, or military weapons. The S&P 500 Index is considered representative of the U.S. stock market.

Information is for illustrative purposes only and does not predict or depict the performance of any investment or the likelihood of achieving any return on an investment. The asset classes shown may not perform in a similar manner in the future. The indices reflect the historical performance of the represented assets; assume the reinvestment of dividends and other distributions; and do not reflect the impact of any fees, expenses, or taxes applicable to an actual investment. Stock markets are volatile. Stock values may fluctuate in response to general economic and market conditions and the prospects of individual companies and industry sectors. Sustainable investing focuses on companies that demonstrate adherence to environmental, social, and corporate governance principles, among other values. There is no assurance that social impact investing can be an effective strategy under all market conditions. Different investment styles tend to shift in and out of favor.

Past performance is no guarantee of future results. An index is unmanaged and not available for direct investment.

UNDERSTANDING RISK EXPOSURE

Risk is more than asset-price volatility

Asset-price volatility is the risk most often cited by investors. Volatility risk—also known as standard deviation—measures the variability of an asset’s returns relative to its average return. A wide variation in returns translates to greater risk under this framework. But variation in return is not the only risk that investors face. Investors should be aware of the variety of risks that may affect their portfolios and should adjust for them appropriately.

Inflation as a risk

Inflation can spike unexpectedly and may occur in conjunction with other risks, such as geopolitical risks. Investors wishing to maintain or increase their purchasing power over time must generate investment returns that exceed the level of inflation. To do so, it is advisable to include asset classes that respond favorably to unexpected inflation, such as Treasury Inflation-Protected Securities (TIPS) and real assets such as commodities and real estate, as part of a well-diversified portfolio. Over time, equities, too, tend to rise during periods of inflation, as earnings may benefit from rising prices.

Major causes of inflation



Economists have tended to group the major causes of inflation into two categories based on whether each factor pushes production prices higher or sparks demand/spending that pulls prices higher.

Cost push

- Shocks in supply
- Higher wages
- Imported inflation
- Higher taxes

Demand pull

- Stronger consumption
- Government spending
- Weaker exchange rate
- Monetary growth
- Higher inflation expectations

Source: Wells Fargo Investment Institute, 2017. Table components extracted from *Principles of Macroeconomics*, N. Gregory Mankiw, Ninth Edition.

The risk of rising interest rates

As the economy continues through the latter stages of recovery and the potential for higher inflation increases, global central banks are expected to tighten monetary policy. Higher interest rates correspond to lower bond prices, posing risks for fixed-income investors, especially those who own longer-term bonds. (Bonds with longer maturities tend to be more interest-rate sensitive than shorter-term bonds.) Investors who own interest-rate-sensitive bonds should be aware of the risks as rates continue to rise.

A look at other market risks

Concentration risk is present when a portfolio holds too much of one asset class or is not well diversified. This type of risk may result in permanent loss of capital. Any single holding could be permanently reduced in value, or the entity may cease to exist altogether, nullifying the value of the holding completely. A plan to systematically reduce a concentrated position, along with regular portfolio rebalancing, can help reduce concentration risk.

Illiquidity risk is the possibility that assets may not be sold in a timely manner. Investors can help limit this risk by allocating an appropriate amount to cash alternatives and other liquid assets to help ensure the ability to buy or sell investments quickly.

Credit risk refers to the risk that an issuer may not be able to make interest or principal payments on debt. Investors can help mitigate credit risk by limiting exposure to lower-quality bonds.

Currency risk is present when changes in foreign exchange rates increase or reduce an investment’s return. Diversification, both internationally and domestically, and hedging can help manage currency risks. Currency hedging seeks to reduce fluctuations in currency exchange rates, typically through the use of forward currency contracts.

Geopolitical risk refers to political events, instability, or policy changes in a country or region that affect investment returns. Diversifying portfolios by country and region can help mitigate risks related to geopolitics.

Key takeaways

- Investors should be aware of the variety of risks that may affect their portfolios and should adjust for them appropriately.
- Most risks can be mitigated through mindful portfolio allocations. For example, an investor could hedge against the risk of rising inflation by holding TIPS, real estate, and stocks.
- Keep in mind that all investing involves risk, including the possible loss of principal.

Risk-takers versus risk avoiders



Understanding risk tolerance—whether an investor is a risk-taker or risk avoider—is crucial to making appropriate investment decisions. Risk tolerance is one way to measure an investor’s ability to withstand losses. Typically, the more risk one is willing to take, the greater the reward one can expect.

Conservative

Investors generally assume a lower amount of risk but may still experience losses or have lower potential returns.

Moderate

Investors are willing to accept a modest level of risk that may result in increased losses in exchange for the potential to receive modest returns.

Aggressive

Investors seek a higher level of return and are willing to accept a higher level of risk that may result in greater losses.



THE PSYCHOLOGY OF RISK AND REWARD

Bubbles can form when asset prices rise based on investor sentiment as opposed to fundamentals. Once sentiment changes, a precipitous sell-off can follow. Staying diversified and focusing on fundamentals can help reduce exposure to asset bubbles.

Are investors rational?

The bedrocks of traditional finance—economics and the efficient market hypothesis—assume that investors make rational investment decisions. But, as human beings, our actions often are driven by emotion, which can result in unpredictable responses to unanticipated market events. Likewise, asset prices do not necessarily reflect underlying valuations but often are driven by investor sentiment. Behavioral finance, an increasingly popular financial discipline, aims to understand investor behavior and identify the factors that cause observed behavior to diverge from purely rational principles. These factors can affect asset valuations, create short-term price distortions, and influence an investor's choice between reward and risk.

For example, a key concept in behavioral finance is *prospect theory*, which describes how investors make decisions that involve risk and gain. People frequently consider losses far more undesirable than comparable gains. Take the following two choices: a 100% chance of losing \$3,000 or a 75% chance of losing \$4,000 and 25% chance of losing nothing. The majority of investors would choose the second option even though these choices are mathematically equivalent.

How investor biases can impede portfolio performance

Investor biases can be grouped under two categories—cognitive and emotional. Generally, it is easier for investors to correct cognitive biases than emotional ones.



Cognitive biases are based on thinking.

- *Overconfidence bias* is believing that one's judgment is better than it is. This can result in underestimating risk and overestimating expected returns.
- *Gambler's fallacy* is wrongly projecting a reversal of a long-term trend. This can result in buying or selling assets at the wrong time.
- *Hot-hand fallacy* is wrongly projecting continuation of a recent trend. This can lead to trend-following or bubble-chasing.

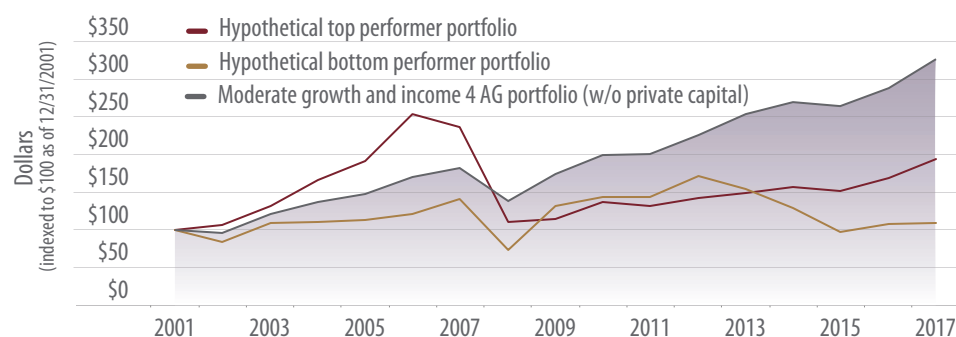


Emotional biases are based on feelings.

- *Status quo bias* is resistance to change, such as when investors fail to make adjustments to their portfolios.
- *Endowment bias* is valuing owned investments over those that are not owned. This bias is often seen with inherited investments.
- *Loss aversion* is strongly avoiding losses at the expense of achieving gains, which can result in holding on to losers too long and selling winners too soon.
- *Regret aversion* is avoiding or delaying decisions out of the fear of making a mistake. This can lead to holding a very conservative portfolio or a following-the-herd mentality.

Chasing past winners or losers is not a successful strategy

Chasing the previous year's top-performing asset class (in other words, hot-hand fallacy) or bottom-performing asset class (in other words, gambler's fallacy) were unsuccessful strategies over the past 15 years. A moderate growth and income portfolio outperformed both approaches.



Source: Wells Fargo Investment Institute and Morningstar Direct; as of December 31, 2017

Hypothetical and past performance are no guarantee of future results. An index is unmanaged and not available for direct investment. The top performer portfolio consists of the top performing asset class of the previous year invested 100% in the portfolio in the current year. The bottom performer portfolio consists of the bottom performing asset class of the previous year invested 100% in the portfolio in the current year. Please see pages 14 and 15 for the model portfolio compositions, definitions of the indices, and risks associated with the representative asset classes.

Key takeaways

- Investors are not always rational, making both cognitive (thinking) and emotional (feeling) decisions.
- Generally, it is easier for investors to correct cognitive biases than emotional ones.
- Because it can be difficult for investors to correct emotional biases, it might be appropriate to use approaches to portfolio construction that include a qualitative, behavioral component.

Using behavioral finance concepts to stay invested

Because it can be difficult for investors to correct for emotional biases, it might be appropriate to use approaches to portfolio construction that include a qualitative, behavioral component. The *behavioral life-cycle model*¹ proposes that investors allocate assets into separate accounts for spending and savings to achieve a trade-off between short-term needs and long-term goals. *Behavioral portfolio theory*² proposes that portfolios be constructed in layers to satisfy investor goals. This is sometimes referred to as goals-based investing, and it can be used as an overlay to traditional portfolio optimization.

Incorporating a behavioral element into an asset allocation strategy may come with a trade-off—forgoing the mathematically optimal portfolio for a more emotionally satisfying portfolio. However, investors who add a behavioral component may be more willing to remain committed to long-term objectives.

1. Source: Shefrin, Hersh M. and Thaler, Richard H., "The Behavioral Life-Cycle Hypothesis," *Economic Inquiry*, October 1988, pages 609–643.

2. Source: Shefrin, Hersh M. and Statman, Meir, "Behavioral Portfolio Theory," *The Journal of Financial and Quantitative Analysis*, Vol. 35, No. 2, June 2000, pages 127–151.

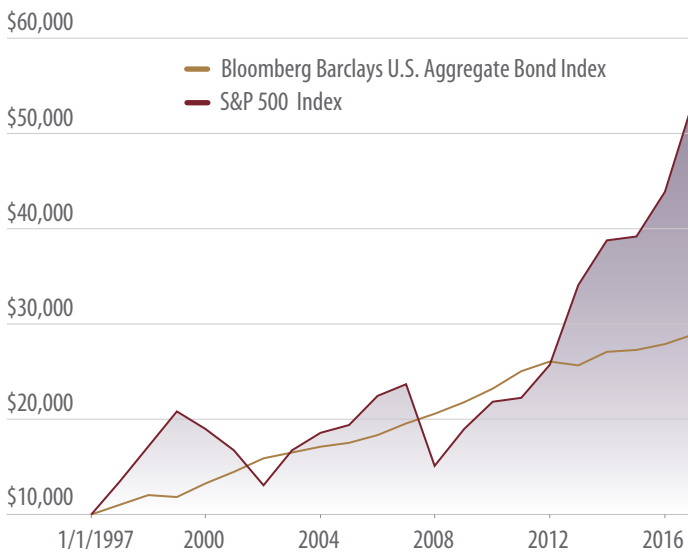
PUTTING IT TOGETHER: BALANCING RISK AND REWARD

Taking compensated risks

Taking on more risk does not necessarily result in greater returns over every time period and for every asset class. As an example, let's look at the performance of U.S. large-cap equities relative to U.S. bonds for two distinct time periods.

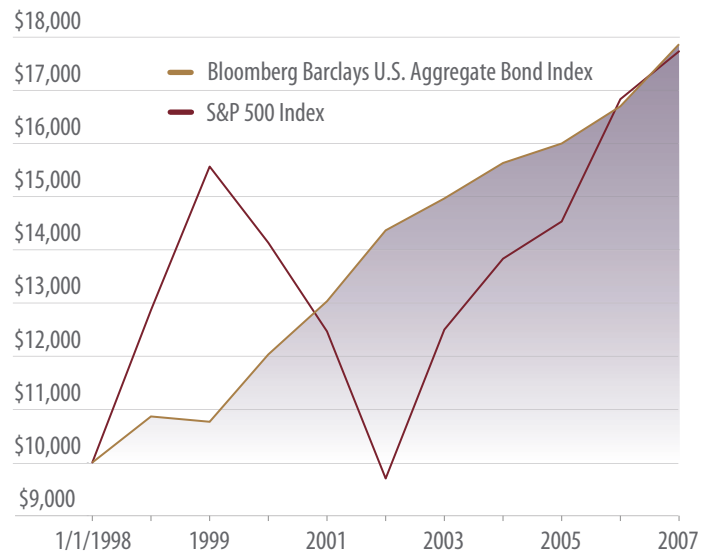
Compensated risk

From 1997 through 2017, the average amount of risk premium—or compensation for risk—that large-cap stocks generated above bonds was 3.2% per year, while the volatility (or standard deviation) was 11.6% higher for equities than for bonds. The 3.2% risk premium was investors' reward for their willingness to take on the additional volatility risk associated with equities.



Uncompensated risk

January 1, 1998, to December 31, 2007, represents a 10-year period of time when U. S. large-cap equity investors took uncompensated risk. During that period of time, U.S. large-cap equities and bonds returned exactly the same amount: 6.0%. Yet, stocks remained more volatile than bonds; there was no equity risk premium.



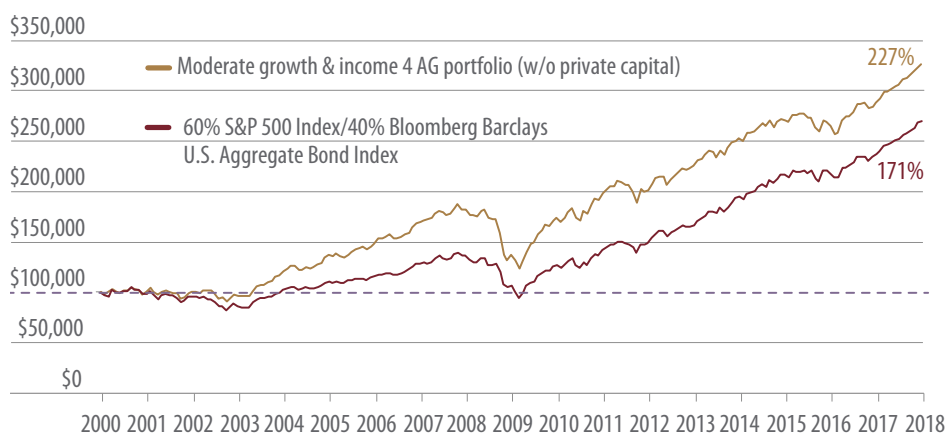
Sources: Morningstar Direct and Wells Fargo Investment Institute. Compensated risk data from January 1, 1997, through December 31, 2017; uncompensated risk data from January 1, 1998, through December 31, 2007. Compounded annual rate of return.

The Bloomberg Barclays U.S. Aggregate Bond Index is a broad-based measure of the investment-grade, U.S.-dollar-denominated, fixed-rate taxable bond market. The S&P 500 Index is generally considered representative of the U.S. stock market.

Index return information is provided for illustrative purposes only. Index returns represent general market results and do not reflect actual portfolio returns; the experience of any investor; or the impact of any fees, expenses, or taxes applicable to an actual investment. Nor do such returns constitute a recommendation to invest in any particular portfolio or strategy. The indices reflect the historical performance of the represented assets and assume the reinvestment of dividends and other distributions. Both stocks and bonds involve risk, and their returns and risk levels can vary depending on prevailing market conditions. Bond prices fluctuate inversely to changes in interest rates.

A diversified portfolio may generate better return for risk

A portfolio that includes global equities, global fixed income, REITs, commodities, and possibly hedge funds may generate a better risk-adjusted return over a full market cycle and reduce the likelihood of uncompensated risk.



Source: Wells Fargo Investment Institute, as of December 31, 2017. Rebalanced quarterly

The Bloomberg Barclays U.S. Aggregate Bond Index is a broad-based measure of the investment-grade, U.S.-dollar-denominated, fixed-rate taxable bond market. The S&P 500 Index is generally considered representative of the U.S. stock market.

Index return information is provided for illustrative purposes only. Performance results for the moderate growth & income four asset group portfolio (without private capital) and the 60/40 portfolio are hypothetical. Hypothetical results do not represent actual trading. Index returns reflect general market results; do not reflect actual portfolio returns or the experience of any investor; and do not reflect the impact of any fees, expenses, or taxes applicable to an actual investment. The indices reflect the historical performance of the represented assets and assume the reinvestment of dividends and other distributions. **Hypothetical and past performance do not guarantee future results.** Please see pages 14 and 15 for the model portfolio compositions, definitions of the indices, and risks associated with the representative asset classes.

Using the Sharpe ratio to gauge risk-adjusted return

One way to measure the amount of return per unit of risk is called the Sharpe ratio. This ratio measures the amount of return in excess of the risk-free rate (usually the return of a three-month U.S. Treasury bill) per unit of risk, as measured by standard deviation. Investors can use projected returns and expected volatility for major asset classes as inputs to estimate whether a particular asset class seems likely to provide enough return to compensate for expected risk.

Adjust risk using tactical asset allocation

Using tactical asset allocation (asset-class weights based on shorter-term expected relative performance) to modify a longer-term, strategic portfolio allocation can help investors adapt to changing market conditions. An investor may decide that an asset is overvalued and pare back holdings of this asset class until conditions are more favorable. On the other hand, an asset may be undervalued, in which case the investor may want to increase the allocation to this asset class.

Key takeaways

- Taking on more risk does not necessarily result in greater returns over every time period and for every asset class.
- A broadly diversified portfolio can help investors achieve better risk-adjusted returns over a full market cycle.
- Tools such as the Sharpe ratio can help investors compare projected return with expected risk across asset classes and portfolios.

CONCLUSION: DIVERSIFYING RISK AND REWARD

The chart below illustrates expected risks and rewards by asset class. Mixing assets together in a portfolio can help mitigate the asset-class-specific risks while capturing many of the potential rewards.

Portfolio implications of balancing risk and reward based on hypothetical asset class returns as of January 2018

Asset class	Strategic (10- to 15-year) hypothetical return	Potential asset-class rewards	Hypothetical strategic standard deviation (risk)	Potential asset-class risks	WFII estimated risk/return trade-off
U.S. Taxable Investment Grade Fixed Income	3.1%	• Event risk mitigation	4.5%	• Interest-rate risk • Duration risk • Credit risk	Neutral
High Yield Taxable Fixed Income	6.1%	High income	12.0%	• Interest-rate risk • Duration risk • Credit risk	Unfavorable
Developed Market ex-U.S. Fixed Income	2.8%	• Event risk mitigation • Global diversification	9.0%	• Interest-rate risk • Duration risk • Credit risk • Currency risk	Unfavorable
Emerging Market Fixed Income	6.8%	• Global diversification • High income	12.0%	• Interest-rate risk • Duration risk • Credit risk • Currency risk • Geopolitical risk	Neutral
U.S. Equities	7.7%	• Inflation hedge	16.5%	• Volatility risk	Neutral
Developed Market ex-U.S. Equities	7.5%	• Inflation hedge • Global diversification	17.5%	• Volatility risk • Currency risk	Neutral
Emerging Market Equities	9.0%	• Inflation hedge • Global diversification	24.0%	• Volatility risk • Currency risk	Neutral
Real Estate Investment Trusts	7.2%	• High income • Inflation hedge	18.0%	• Volatility risk • Interest-rate risk • Real estate market risk	Favorable
Commodities	4.4%	• Inflation hedge	15.0%	• Volatility risk • Commodity bear-market supercycle risk	Unfavorable
Hedge Funds	5.1%	• Absolute return potential • Diversification	5.8%–8.8%	• Liquidity risk • Leverage risk • Event risk • Transparency risk • Operational risk • Short sales • Derivatives	Favorable

Source: Wells Fargo Investment Institute, as of December 31, 2017. Strategic (10- to 15-year) hypothetical returns are forward-looking estimates from Wells Fargo Investment Institute of how asset classes and combinations of classes may respond during various market environments. Hypothetical returns do not represent the returns that an investor should expect in any particular year. They are not designed to predict actual portfolio performance and may differ greatly from actual performance. They are based on estimates and assumptions that may not occur. Standard deviation is a measure of volatility. It reflects the degree of variability surrounding the outcome of an investment decision; the higher the standard deviation, the greater the risk. Index returns reflect general market results and do not reflect the impact of any fees, expenses, or taxes applicable to an actual investment. An index is unmanaged and not available for direct investment. **Hypothetical and past performance is no guarantee of future results.** Different investments offer different levels of potential return and market risk. Please see pages 14 and 15 for the definitions of the indices and risks associated with the representative asset classes.

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PORTFOLIO COMPOSITIONS AND DEFINITIONS

Composition for moderate growth and income 4 AG (four asset group) portfolio, pages 9 and 11:

Moderate growth and income four asset group portfolio (without private capital): Moderate growth and income four asset-group portfolio is composed of 3% Bloomberg Barclays 1–3 Month U.S. Treasury Bill Index, 11% Bloomberg Barclays U.S. Aggregate Bond Index (5–7Y), 6% Bloomberg Barclays U.S. Aggregate Bond Index (10+Y), 6% Bloomberg Barclays U.S. Corporate High Yield Bond Index, 3% J.P. Morgan GBI Global ex-U.S. Index, 5% J.P. Morgan Emerging Markets Bond Index Global, 20% S&P 500 Index, 8% Russell Midcap® Index, 6% Russell 2000® Index, 5% MSCI EAFE Index, 5% MSCI Emerging Markets Index, 5% FTSE EPRA/NAREIT Developed Index, 2% Bloomberg Commodity Index, 3% HFRI Relative Value Index, 6% HFRI Macro Index, 4% HFRI Event-Driven Index, and 2% HFRI Equity Hedge Index.

Composition for hypothetical portfolios, page 9, and asset classes, page 12:

All 16 major asset classes: **cash alternatives:** Bloomberg Barclays 1–3 Month U.S. Treasury Bill Index; **short-term fixed income:** Bloomberg Barclays U.S. Aggregate Bond Index (1–3Y); **intermediate-term fixed income:** Bloomberg Barclays U.S. Aggregate Bond Index (5–7Y); **long-term fixed income:** Bloomberg Barclays U.S. Aggregate Bond Index (10+Y); **investment-grade fixed income:** Bloomberg Barclays U.S. Aggregate Bond Index; **high-yield fixed income:** Bloomberg Barclays U.S. Corporate High Yield Bond Index; **developed-market ex-U.S. fixed income:** J.P. Morgan GBI Global ex-U.S. Index; **emerging-market fixed income:** J.P. Morgan Emerging Markets Bond Index Global; **U.S. large-cap equities:** S&P 500 Index; **U.S. mid-cap equities:** Russell Midcap Index; **U.S. small-cap equities:** Russell 2000 Index; **developed-market ex-U.S. equities:** MSCI EAFE Index; **emerging-market equities:** MSCI Emerging Markets Index; **public real estate:** FTSE EPRA/NAREIT Developed Index; **commodities:** Bloomberg Commodity Index; and **hedge funds:** HFRI Fund Weighted Composite Index.

Hypothetical top-performer portfolio: Select the top-performing asset class out of 16 major asset classes of the previous year and invest 100% of portfolio in it in the current year. **2002:** 100% Bloomberg Barclays U.S. Aggregate Bond Index (1–3Y); **2003:** 100% Bloomberg Commodity Index; **2004:** 100% MSCI Emerging Markets Index; **2005:** 100% FTSE EPRA/NAREIT Developed Index; **2006:** 100% MSCI Emerging Markets Index; **2007:** 100% FTSE EPRA/NAREIT Developed Index; **2008:** 100% MSCI Emerging Markets Index; **2009:** 100% J.P. Morgan GBI Global ex-U.S. Index; **2010:** 100% MSCI Emerging Markets Index; **2011:** 100% Russell 2000 Index; **2012:** 100% Bloomberg Barclays U.S. Aggregate Bond Index (10+Y); **2013:** 100% FTSE EPRA/NAREIT Developed Index; **2014:** 100% Russell 2000 Index; **2015:** 100% Bloomberg Barclays U.S. Aggregate Bond Index (10+Y); **2016:** 100% S&P 500 Index; and **2017:** 100% Russell 2000 Index.

Hypothetical bottom-performer portfolio: Select the bottom-performing asset class out of 16 major asset classes of the previous year and invest 100% of portfolio in it in the current year. **2002:** 100% MSCI EAFE Index; **2003:** 100% S&P 500 Index; **2004:** 100% Bloomberg Barclays 1–3 Month U.S. Treasury Bill Index; **2005:** 100% U.S. Treasury T-Bill Constant Maturity Rate 3-Month Index; **2006:** 100% J.P. Morgan GBI Global ex-U.S. Index; **2007:** 100% Bloomberg Commodity Index; **2008:** 100% FTSE EPRA/NAREIT Developed Index; **2009:** 100% MSCI Emerging Markets Index; **2010:** 100% Bloomberg Barclays U.S. Aggregate Bond Index (10+Y); **2011:** 100% Bloomberg Barclays 1–3 Month U.S. Treasury Bill Index; **2012:** 100% MSCI Emerging Markets Index; **2013:** 100% Bloomberg Commodity Index; **2014:** 100% Bloomberg Commodity Index; **2015:** 100% Bloomberg Commodity Index; **2016:** 100% Bloomberg Commodity Index; and **2017:** 100% Bloomberg Barclays 1–3 Month U.S. Treasury Bill Index.

Definitions for indices, pages 2, 9, 11, and 12:

The Bloomberg Barclays U.S. Aggregate Bond Index is unmanaged and composed of the Barclays U.S. Government/Corporate Bond Index, Mortgage-Backed Securities Index, and Asset-Backed Securities Index. It includes Treasury issues, agency issues, corporate bond issues, and mortgage-backed securities.

The Bloomberg Barclays 1–3 Month U.S. Treasury Bill Index includes all publicly issued zero-coupon U.S. Treasury bills that have a remaining maturity of less than three months and more than one month, are rated investment grade, and have \$250 million or more of outstanding face value. In addition, the securities must be denominated in U.S. dollars and must be fixed rate and nonconvertible.

The Bloomberg Barclays U.S. Aggregate 1–3 Year Bond Index is unmanaged and is composed of the Barclays U.S. Government/Credit Index and the Bloomberg Barclays U.S. Mortgage-Backed Securities Index and includes Treasury issues, agency issues, corporate bond issues, and mortgage-backed securities with maturities of one to three years.

The Bloomberg Barclays U.S. Aggregate 5–7 Year Bond Index is unmanaged and is composed of the Barclays U.S. Government/Credit Index and the Barclays U.S. Mortgage-Backed Securities Index; it includes Treasury issues, agency issues, corporate bond issues, and mortgage-backed securities with maturities of five to seven years.

The Bloomberg Barclays U.S. Aggregate 10+ Year Bond Index is unmanaged and is composed of the Barclays U.S. Government/Credit Index and the Barclays U.S. Mortgage-Backed Securities Index; it includes Treasury issues, agency issues, corporate bond issues, and mortgage-backed securities with maturities of 10 years or more.

The Bloomberg Barclays U.S. Corporate High Yield Bond Index covers the universe of fixed-rate, non-investment-grade debt.

The Bloomberg Commodity Index is a broadly diversified index composed of 22 exchange-traded futures on physical commodities and represents 20 commodities weighted to account for economic significance and market liquidity.

The FTSE EPRA/NAREIT Developed Index is designed to track the performance of listed real estate companies and REITs in developed countries worldwide.

The HFRI Equity Hedge (Total) Index is managed by maintaining positions both long and short in primarily equity and equity-derivative securities.

The HFRI Event Driven (Total) Index is managed by maintaining positions in companies currently or prospectively involved in corporate transactions of a wide variety, including but not limited to mergers, restructurings, financial distress, tender offers, shareholder buybacks, debt exchanges, security issuance, or other capital structure adjustments.

The HFRI Fund Weighted Composite Index is a global, equal-weighted index of over 2,000 single-manager funds that report to HFR Database. Constituent funds report monthly net-of-all-fees performance in U.S. dollars and have a minimum of \$50 million under management or a 12-month track record of active performance. The HFRI Fund Weighted Composite Index does not include Funds of Hedge Funds. The HFRI Fund Weighted Composite Index is a composite of the hedge funds that employ the alternative strategies and who report their performance figure to HFRI. The number of hedge funds reporting may vary between each reporting period.

The HFRI Macro (Total) Index is managed by trading a broad range of strategies in which the investment process is predicated on movements in underlying economic variables and the impact these have on equity, fixed-income, hard currency, and commodity markets. Managers employ a variety of techniques: both discretionary and systematic analyses, combinations of top-down and bottom-up theses, quantitative and fundamental approaches, and long- and short-term holding periods.

The HFRI Relative Value (Total) Index is managed by maintaining positions in which the investment thesis is predicated on realization of a valuation discrepancy in the relationship between multiple securities. Managers employ a variety of fundamental and quantitative techniques to establish investment theses, and security types range broadly across equities, fixed income, derivatives, or other security types.

The J.P. Morgan Global ex-United States (JPM GBI Global ex-U.S.) Index is a total return, market-capitalization-weighted index, rebalanced monthly, consisting of the following countries: Australia, Germany, Spain, Belgium, Italy, Sweden, Canada, Japan, the United Kingdom, Denmark, the Netherlands, and France.

The J.P. Morgan Emerging Markets Bond Index Global (EMBI Global) Index currently covers 27 emerging-market countries. Included in the EMBI Global are U.S.-dollar-denominated Brady bonds, Eurobonds, traded loans, and local-market debt instruments issued by sovereign and quasi-sovereign entities.

The MSCI EAFE Index is a free-float-adjusted market-capitalization-weighted index that is designed to measure the equity market performance of developed markets, excluding the U.S. and Canada.

The MSCI Emerging Markets Index is a free-float-adjusted market-capitalization-weighted index that is designed to measure equity market performance of emerging markets.

The Russell Midcap® Index measures the performance of the 800 smallest companies in the Russell 1000® Index.

The Russell 2000 Index measures the performance of the 2,000 smallest companies in the Russell 3000® Index, which represents approximately 8% of the total market capitalization of the Russell 3000 Index.

The S&P 500 Index is a market-capitalization-weighted index composed of 500 widely held common stocks that are generally considered representative of the U.S. stock market.

Risk considerations for model portfolios, pages 9 and 11:

Equity securities are subject to market risk, which means their value may fluctuate in response to general economic and market conditions, the prospects of individual companies, and industry sectors. Investments in equity securities are generally more volatile than other types of securities. Investing in **small- and mid-cap companies** involves additional risks than investing in large-cap companies, such as limited liquidity and greater volatility. **Foreign investments** entail special risks, such as currency, political, and economic risks and different accounting standards. These risks are heightened in emerging markets. **Fixed-income investments** are subject to interest-rate, credit/default, liquidity, inflation, and other risks. Prices tend to be inversely affected by changes in interest rates. **High-yield fixed-income securities** are considered speculative, involve greater risk of default, and tend to be more volatile than investment-grade fixed-income securities. **Treasury bills are subject** to interest-rate risks and are guaranteed as to payment of principal and interest if held to maturity. **Foreign investing** involves greater risks than those associated with investing domestically, including political, economic, and currency risks and the risks associated with different accounting standards. These risks are heightened in emerging markets. **Commodity investments** may be affected by changes in overall market movements, commodity index volatility, changes in interest rates, or factors affecting a particular industry or commodity. **Hedge fund strategies, such as equity hedge, event driven, macro, and relative value**, may expose investors to risks such as short selling, leverage risk, counterparty risk, liquidity risk, volatility risk, and other significant risks. **Real estate investments** are subject to special risks, including the possible illiquidity of the underlying properties, credit risk, interest-rate fluctuations, and the impact of varied economic conditions.

Other risk considerations:

The use of currency forwards to hedge currency exposure back to the U.S. dollar can expose an investor to additional risks. Currency risk is the risk that foreign currencies will decline in value relative to that of the U.S. dollar. The exchange rate between the U.S. dollar and foreign currencies may cause the value of an investment to decline. The use of hedging to manage currency exchange rate movements may not be successful and could produce disproportionate gains or losses in a portfolio and may increase volatility and costs. The use of derivatives involves other risks such as market, interest-rate, credit, counterparty, and management risks. Counterparty risk is the risk that the other party to the agreement will default at some time during the life of the contract. Investing in derivatives carries the risk of the underlying instrument as well as the derivative itself and may not be successful, resulting in losses to a portfolio, and the cost of such strategies also may reduce a portfolio's returns.

Event risk is the risk that certain unexpected or unpredictable events will negatively effect a proposed investment, causing a portfolio to incur loss. Leverage can magnify any price movements, resulting in high volatility and potentially significant loss of principal. Liquidity risk is the risk that a secondary market may not exist for interests in a fund and none may be expected to develop. Operational risk is the risk of loss that results from a manager's operations and includes business risks, system risks, personnel risks, and reputational and headline risks. Transparency refers to a lack of information regarding a portfolio's holdings needed to understand the portfolio's exposure to potential risks.

Sustainable investing focuses on companies that demonstrate adherence to environmental, social, and corporate governance principles, among other values. There is no assurance that social impact investing can be an effective strategy under all market conditions. Different investment styles tend to shift in and out of favor. In addition, a strategy's social policy could cause it to forgo opportunities to gain exposure to certain industries, companies, sectors, or regions of the economy, which could cause it to underperform similar portfolios that do not have a social policy.

Treasury Inflation-Protected Securities (TIPS) are subject to interest-rate risk, especially when real interest rates rise. This may cause the underlying value of the bond to fluctuate more than other fixed-income securities. TIPS have special tax consequences, generating phantom income on the inflation compensation component of the principal. A holder of TIPS may be required to report this income annually although no income related to inflation compensation is received until maturity.

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