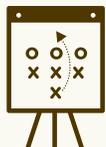


ASK THE INSTITUTE



What is traditional finance?

Traditional financial theories assume:

- Markets are efficient
- Market prices of assets reflect all available and pertinent information
- Investors are rational and do not allow emotions such as fear or greed to influence their investment decisions
- Investors are well-informed and have access to all market information



What is behavioral finance?

Behavioral finance is a field that has been growing over the past few decades and today is an important area for academic researchers and market practitioners alike. It considers the role psychology and emotions play in making financial decisions. It also recognizes that investors aren't all equally informed.

How does behavioral finance differ from traditional finance?

The assumptions behind traditional finance are, in all likelihood, not realistic. Investors are, after all, human, and psychology and emotions influence their decision-making. Behavioral finance recognizes these shortcomings of traditional finance and incorporates the behavior and common biases of investors into its analyses.

May 2018

How can emotions influence investment decision-making?

Key takeaways

- ▶ Investors are not always rational; both cognitive (thinking) and emotional (feeling) biases influence our decision-making.
- ▶ Generally, it is easier for investors to correct cognitive biases than emotional ones.
- ▶ Because it may be difficult for investors to correct emotional biases, it might be appropriate to use approaches to construct portfolios that include a qualitative or behavioral component.

Filling the gaps in traditional finance

The bedrocks of traditional finance—economics and the efficient-market hypothesis—assume investors make rational investment decisions. But, in reality, as human beings, our actions often are driven, at least in part, by emotion, which can result in unpredictable and not always rational 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 they find comparable gains desirable, as discussed below.

Take the following choices:



Studies have shown that given the first scenario, most people will avoid the risk and take the first option (the sure \$3,000 gain). On the other hand, when presented the second scenario, most favor the second option (the 75% chance of losing \$4,000) because it offers the possibility of avoiding the pain of a loss. Keep in mind, all the 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.

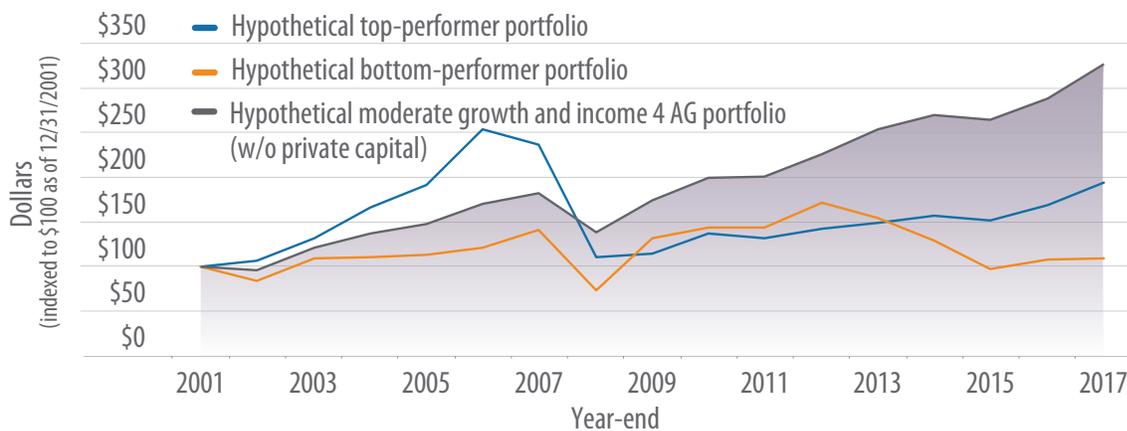


Emotional biases are based on feelings.

- ▶ *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, particularly in volatile markets.
- ▶ *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 have not been successful strategies

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.



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

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. Information provided is hypothetical and for illustrative purposes only. It does not constitute a recommendation to invest in any particular asset class or strategy and is not a promise of future performance or an estimate of actual returns an investment may achieve. Hypothetical returns do not represent investment returns or the results of actual trading. Index returns represent general market results; assume the reinvestment of dividends and other distributions; and do not reflect deductions for fees, expenses, or taxes applicable to an actual investment. Unlike most asset-class indices, HFR Index returns reflect deductions for fees and expenses. Because the HFR indices are calculated based on information that is voluntarily provided, actual returns may be higher or lower than those reported. An index is unmanaged and not available for direct investment. **Hypothetical performance and past performance do not guarantee future results.** Please see pages 4 and 5 for the model portfolio compositions, definitions of the indices, and risks associated with the representative asset classes.

The psychology of risk and reward

Investor behavior can affect asset prices as much as underlying fundamentals can. 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.



Take, for example, what's come to be known as the dot-com, or internet, bubble of the late 1990s. Soon after the broad commercialization of the internet, investors realized its potential to transform our everyday lives (which it clearly has). What they were overoptimistic about was companies' abilities to create profitable and sustainable internet-based businesses.

In response to investor enthusiasm about these companies, the Nasdaq Composite Index, where many of these stocks were listed, rose 189% during the two years leading up to

its peak on March 10, 2000. Perhaps more significantly, the price/earnings (P/E) ratio—a frequently used measure of how expensive stocks are (the higher the ratio, the more expensive a stock is considered to be)—was 175. By comparison, today the Nasdaq P/E is approximately 26. That suggests many investors were caught up in the furor over the *New Economy* and were ignoring the fundamentals.

When investors realized it would be a long time (if ever) before many of these companies became profitable, the bubble burst and stock prices plummeted.



The lesson investors should have learned was the importance of being diversified and investing primarily based on fundamentals—not on emotion and the fear of missing out on the next big thing. Of course, diversification strategies do not guarantee investment returns or eliminate the risk of loss.

Using behavioral finance concepts to help reach your financial goals

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 model¹ 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 theory² proposes that portfolios be constructed in layers, as shown below, 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 one that's more emotionally satisfying. However, investors who add a behavioral component may be more willing to remain committed to their long-term objectives.

Behavioral portfolio theory

Using behavioral portfolio theory, or goals-based investing, portfolios are constructed in layers designed to satisfy different investor goals. As you move up the layers, risk increases.



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," *Journal of Financial and Quantitative Analysis*, Vol. 35, No. 2, June 2000, pages 127–151

Composition for hypothetical portfolios, page 3:

Moderate growth and income four-asset-group (4 AG) portfolio (without private capital): The 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.

Hypothetical top-performer portfolio: Select the top-performing asset class out of 16 major asset classes of the previous year and invest 100% of the 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 the 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:

The **Bloomberg Barclays U.S. Aggregate Bond Index** is unmanaged and is composed of the Bloomberg 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 Bloomberg Barclays U.S. Government/Credit Index and the Bloomberg Barclays U.S. Mortgage-Backed Securities Index; it 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 Bloomberg Barclays U.S. Government/Credit Index and the Bloomberg 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 Bloomberg Barclays U.S. Government/Credit Index and the Bloomberg 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 real estate investment trusts 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 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, and other security types.

The **J.P. Morgan GBI 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 the 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 hypothetical portfolios:

Each asset class has its own risk and return characteristics which should be evaluated carefully before making any investment decision. The level of risk associated with a particular investment or asset class generally correlates with the level of return the investment or asset class might achieve.

Options involve risk and are not suitable for all investors. Before opening an option position, a person must receive a copy of *Characteristics and Risks of Standardized Options*. This document is available from the Options Clearing Corporation, One North Wacker Drive, Suite 500, Chicago, Illinois 60606. Please read it carefully before investing.

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.

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