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Efficient Frontier 101

What Is an Efficient Frontier?

It is the set of asset mixes that, for each amount of risk taken, have the best expected returns. It is calculated from the assumed risks and returns of the available asset types and the assumed correlations between those returns.

Why Do I Want my Portfolio to Be on an Efficient Frontier?

A portfolio that falls on an efficient frontier is, in theory, expected to achieve the best return for the level of risk with which you are comfortable.

How Is Risk Measured?

In determining an efficient frontier, risk for an investment is calculated using its standard deviation—how much its return is expected to vary from its average investment return. The higher the standard deviation, the riskier the investment is considered to be.

This narrow definition addresses volatility but does not capture other types of risk that might concern you, such as illiquidity risk, credit risk, and inflation risk.

How Can I Use an Efficient Frontier to Help Build my Portfolio?

Key Takeaways

- There are many efficient frontiers, depending on the range of investment opportunities you have and what constraints you want to impose.
- Your efficient frontier can help you understand the best return you can expect from your portfolio given the level of volatility you are willing to accept.
- After determining your efficient frontier, you still need to apply common sense to building a portfolio because the numbers that underlie the calculations represent expectations, not certainties, about the future.

Creating an Efficient Frontier

There is an infinite number of portfolios that you could construct from the stocks, bonds, and other assets available to you. Each blend has an overall risk and overall return level. In this hypothetical graph of many portfolio blends, the pies farthest to the left and highest up are the ones with the best expected risk/return tradeoffs. Connecting those "dots" forms an efficient frontier.

Connecting the Dots to Determine an Efficient Frontier

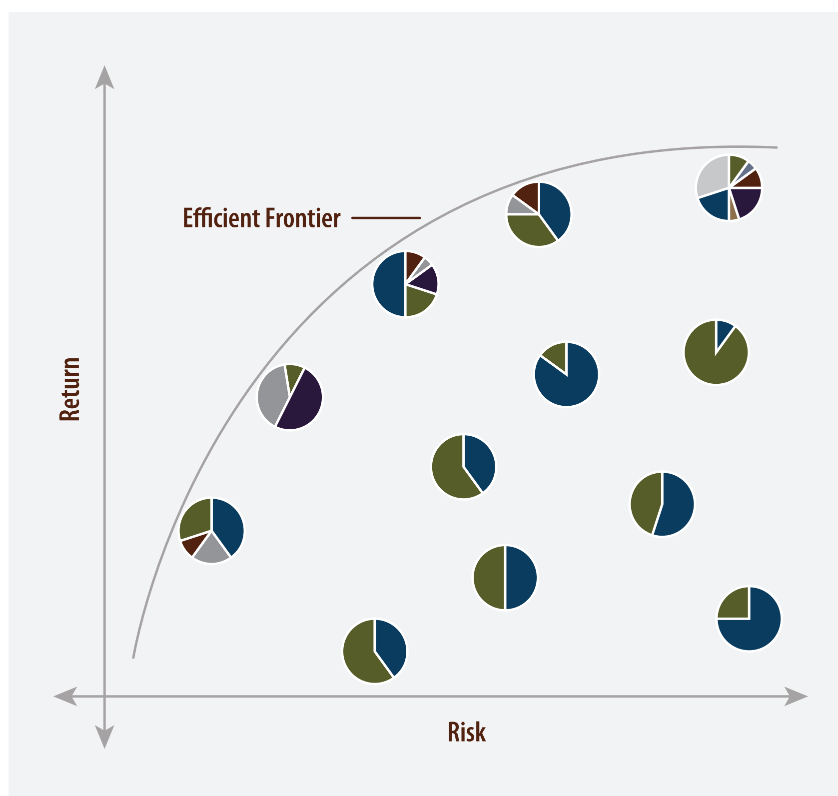


Chart is conceptual and does not reflect any actual returns or represent any specific asset classifications.

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

Improving Your Portfolio

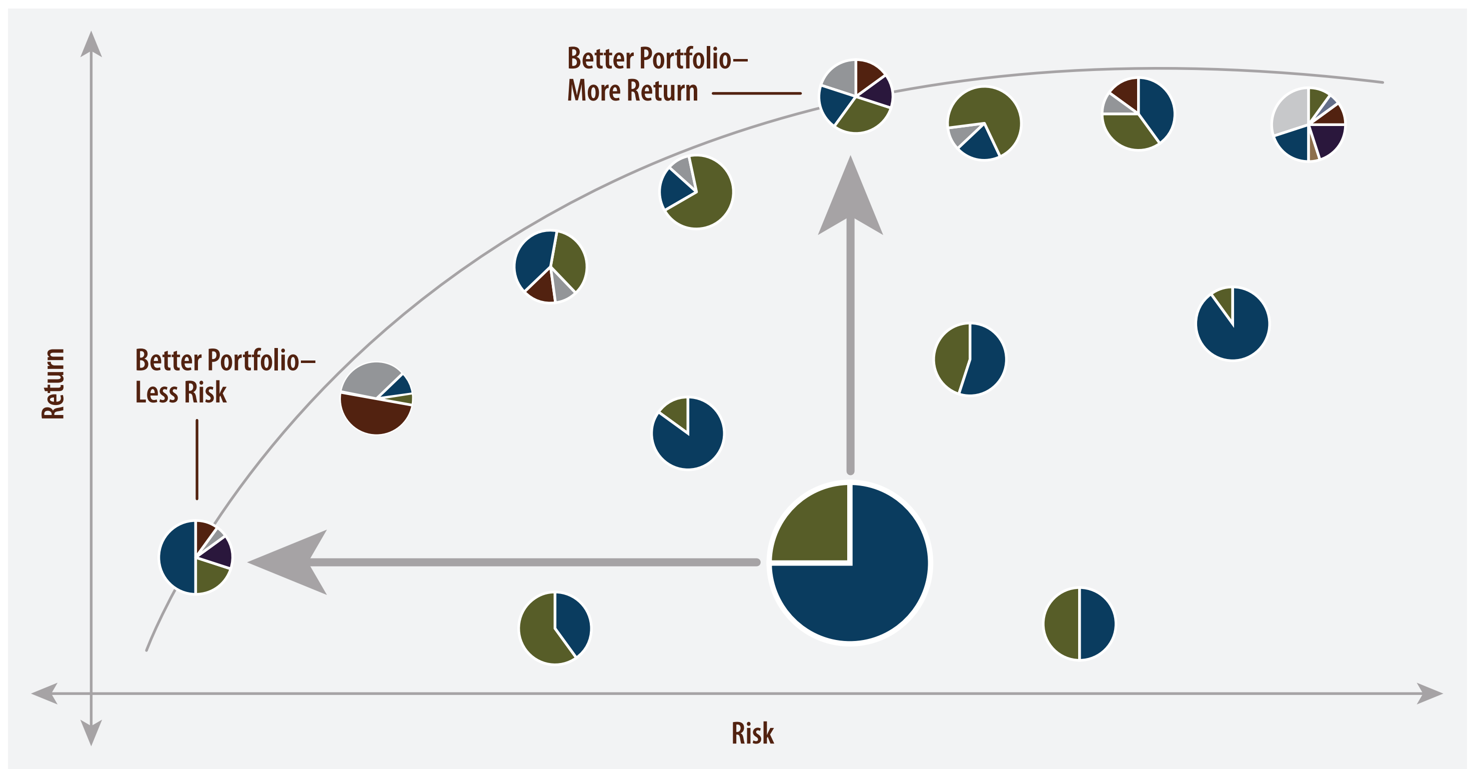
Let's say your portfolio is the larger pie in the conceptual chart below. Clearly, it is not efficient. You have the opportunity to reduce risk, improve return, or both.

How to reduce risk? The efficient frontier may tell you that you are taking more risk than you need to for the return you might receive. A likely cause is lack of diversification. Diversification may typically lower portfolio volatility, pushing your portfolio to the left. Possibly, you have ruled out whole classes of assets that could have better diversified your portfolio. You might want to rethink this.

How to increase return? You may have shied away from higher-return assets because they are also higher-risk. But riskier assets don't necessarily add up to a riskier portfolio, as long as they are sufficiently diversified. The efficient frontier is telling you hypothetically that better returns could be possible for your chosen volatility level.

In short, the model portfolios on the efficient frontier have sought to mitigate risk through diversification. They still have market risk and other inherent risks that can't be diversified away. But the key point is that these portfolios are not taking risk that they don't have to take because avoidable risk is not compensated by increased return.

You Decide: Reduce Risk or Increase Return Potential



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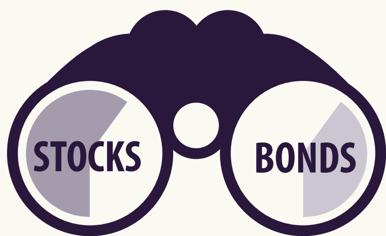
Looking Beyond Treasury Bonds May Help Reduce Risk



If you want to mitigate risk, you may think an all-bond portfolio is the answer. However, an efficient frontier for stocks and 20-year U.S. government bonds for the 1970-2015 period indicated that a hypothetical 33-percent stock/67-percent 20-year U.S. government bond portfolio offered significantly less risk and somewhat better returns. In fact, a hypothetical 60-percent stock/40-percent 20-year U.S. government bond portfolio would have achieved better returns for about the same amount of risk as the 100-percent 20-year U.S. government bond portfolio.[1]

[1] Morningstar, 2016. For illustrative purposes only. Stocks represented by the Ibbotson Large Company Stock Index and bonds by the 20-year U.S. Treasury bond. Return and risk based on annual returns and their standard deviations over the 1970-2015 period. An index is unmanaged and not available for direct investment. Hypothetical results do not represent actual trading, and the results achieved do not represent the experience of any individual investor. Different investments offer different levels of potential return and market risk. Please see page 4 for a description of the risks associated with investing in stocks and bonds. Past performance is no guarantee of future results.

The Family of Efficient Frontiers

Opportunities and constraints determine an efficient frontier.

An efficient frontier based on expected returns for a portfolio consisting of four major asset groups (stocks, bonds, commodities/real estate, and alternative investments) may offer better opportunities than a three-asset-group frontier that excludes alternative investments. This is why we consistently advocate wide global diversification. Conversely, the prudent constraints that we impose make the opportunities appear less attractive—although, as explained below, they are key to risk management.

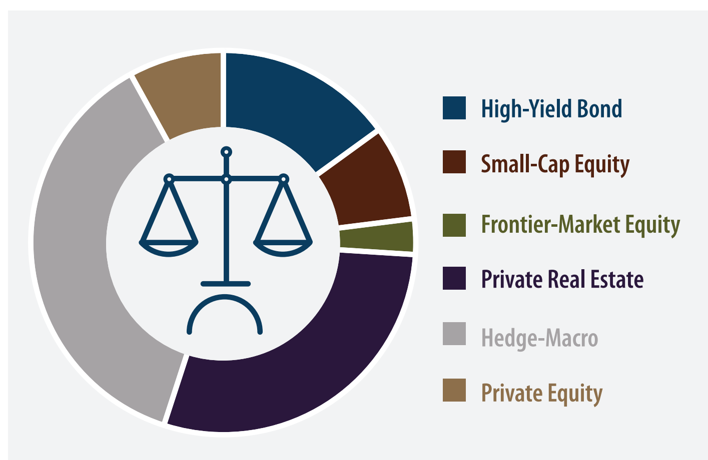
The investment process starts with determining where your portfolio lies along your efficient frontier. Your investment professional will typically ask you questions about your attitude toward capital loss, volatility, and liquidity needs. Your responses determine your risk level.

Your investment professional may recommend a more widely diversified portfolio, if appropriate for you. This portfolio may include the full range of assets your investment professional would consider investible, including hedge funds and private capital. Some of these investments require investors to meet certain income and net worth requirements. For an investor not meeting those requirements, a portfolio diversified among stocks and bonds may be recommended. An investor with constraints, such as a need for cash or a concentrated holding that can't be sold, might have to invest in a less-diversified portfolio.

In the graph below, all the frontiers are constrained, which means there are limits on the amount invested in each asset class that can be included. Some efficient frontiers are more constrained than others. A completely unconstrained portfolio could look more attractive than any of the constrained ones for short time periods—but we caution that this is true only in theory.

An unconstrained optimized portfolio at a risk level typical of "balanced" portfolios might look like the chart below:

An Optimized Portfolio Isn't Necessarily a Good Portfolio



The unconstrained portfolio, while it may have an attractive risk/return profile on paper, is not advisable. It may be heavily focused on asset classes that we recommend only in small doses. It may be entirely devoid of such bread-and-butter asset classes as large-cap stocks and investment-grade bonds. Unless we could be highly certain of the risks and returns for each of the asset classes—which we can't—it would be highly imprudent to invest in an unconstrained portfolio. Consequently, we apply prudent constraints to our process of optimizing portfolios. For example, even in an aggressive portfolio, we would not recommend that small-cap or emerging-market stocks dominate an equity portfolio.

Which Efficient Frontier Is Best?

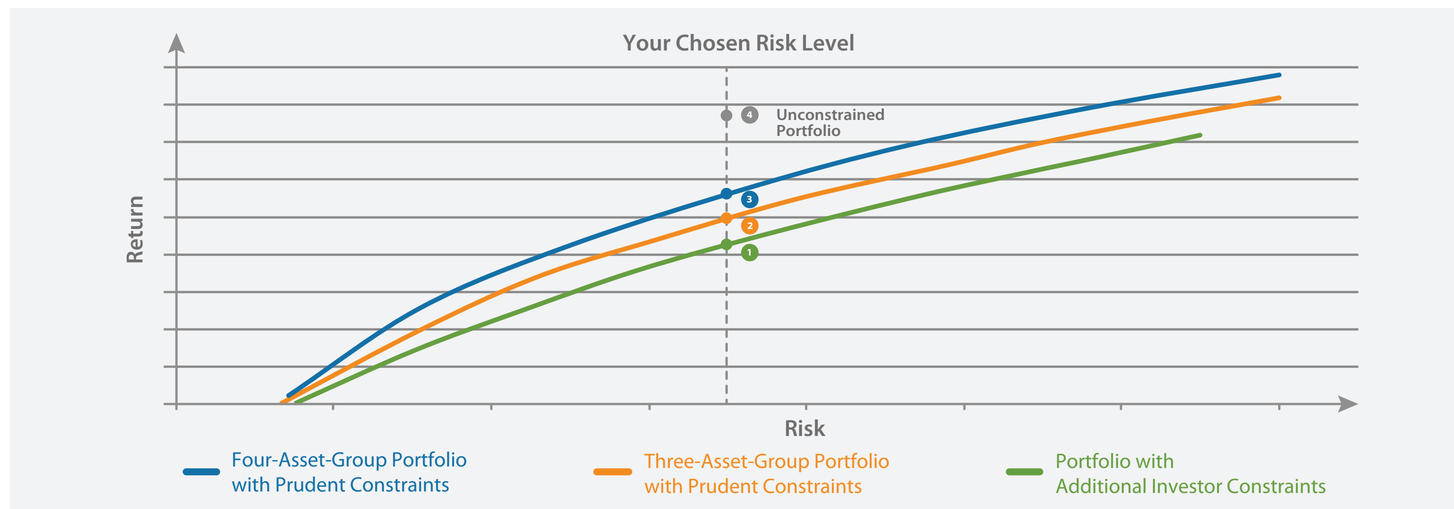


Chart is conceptual and does not reflect any actual returns or represent any specific asset classifications. There are no guarantees that a four asset class portfolio with prudent constraints will outperform any other portfolio with more or less assets classes, or constraints.

Beyond the Efficient Frontier

The concept of the efficient frontier was a revelation back in the 1950s, enabling investors to see beyond the risk and return of individual assets to the risk and return of diversified portfolios. Still, the analysis is historical, and it measures risk solely by volatility. History can tell us only what has happened; it cannot capture the range of things that might happen in the future.

In recent years, we have seen volatility erupt in areas of the market where relative calm had previously prevailed. Asset prices were crushed because the assets were too illiquid or too highly leveraged or too exposed to some sector or too vulnerable in some other way. Investors who looked only to history were blindsided when the environment shifted and awakened dormant risks.

True portfolio diversification is really about diversifying the sources of risk. We don't recommend minimizing all risks in a portfolio because that would mean giving up all potential return, but we do encourage paying attention to the sources of risk when it comes time to construct a portfolio according to the strategic mix chosen from the efficient frontier.

Three Steps for Getting Started

In summary, having a portfolio that's on an efficient frontier can help optimize your return for the level of risk you're comfortable with. To help ensure your portfolio is on an efficient frontier, you can start by:

1. Working with your investment professional to review your investment objectives
2. Having a written plan for working toward your objectives
3. Making sure your investments are allocated to match your investment plan

Down the road, you may need to adjust your plan due to life events (marriage, birth, death, divorce) that cause you to change your objectives. Also, you may want to review your portfolio periodically with an investment professional and rebalance your investments when necessary to stick with your plan over time.

Asset allocation and diversification are investment methods used to help manage risk. They do not ensure a profit or protect against market loss. All investing involves risks, including the possible loss of principal. There can be no assurance that any investment strategy will be successful. Investments fluctuate with changes in market and economic conditions and in different environments due to numerous factors, some of which may be unpredictable.

Each asset class has its own risk and return characteristics which should be evaluated carefully before making any investment decision. **Stocks** 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. **Bonds** are subject to interest rate, price, and credit risks. Prices tend to be inversely affected by changes in interest rates. **Government securities** are guaranteed as to payment of principal and interest by the U.S. government if held to maturity and are subject to interest rate risk. **Real assets** are subject to the risks associated with real estate, commodities, and other investments and may not be suitable for all investors. **Alternative investments,** such as private equity and hedge funds, trade in diverse complex strategies that are affected in different ways and at different times by changing market conditions. Strategies may, at times, be out of market favor for considerable periods with adverse consequences. The use of alternative investments includes the risk of investment loss, including the loss of the entire amount invested. While investors may potentially benefit from the ability of alternative investments to potentially improve the risk-reward profiles of their portfolios, the investments themselves can carry significant risks.

Ibbotson SBBI U.S. Large Cap Stock Index tracks the performance of the S&P 500 Index stocks. An index is unmanaged and not available for direct investment.

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