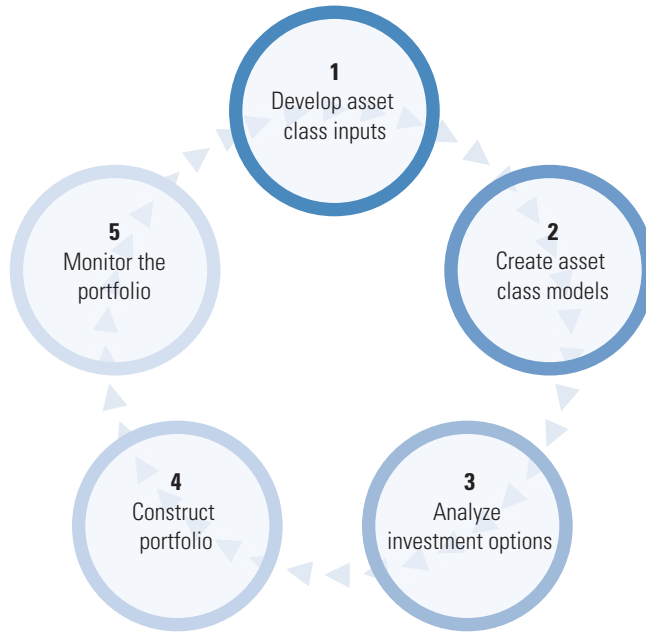


# Ibbotson Asset Allocation Methodology

## Ibbotson Investment Management Process



### Step 1: Develop asset class inputs

Expected returns  
Standard deviations  
Correlations

### Step 2: Create asset class models

Mean-variance optimization  
Resampling  
Sensitivity analysis

### Step 3: Analyze investment options

Returns-based style analysis  
Additional quantitative factors  
Qualitative factors

### Step 4: Construct portfolio

Alpha-tracking error optimization

### Step 5: Monitor the portfolio

Annual strategic asset allocation review  
Periodic manager review

## An Innovative Leader

By leveraging years of financial research and theories, Ibbotson developed its own proprietary asset allocation methodology. Today, Ibbotson offers a top-down investment management process to build robust portfolios based on sound asset allocation principles for financial institutions. Our methodology is a rigorous, standardized 5-step process which is customized for our clients based on their needs.

### 1. Develop asset class inputs

Ibbotson begins by analyzing broad asset classes and constructs long-term expected returns, standard deviations, and correlation coefficients. These form the inputs for the mean-variance optimization, a statistical technique described in Step 2. Because forecasting is a critical and pivotal step in the asset allocation process, Ibbotson develops proprietary capital market forecasts for each asset class using a combination of historical data, current market information, and additional analysis. Each forecast becomes an input in portfolio creation.

### 2. Create asset class models

Ibbotson creates the asset class models on the basis of mean-variance optimization, a Nobel prize-winning economic theory. Optimization looks at the expected risk and return of each asset class along with the correlation among asset classes, and determines which combination of asset classes will provide the highest expected return for any risk level. The goal of optimization is to identify asset allocations that maximize returns for a given level of risk or minimize risk for a given level of return. Ibbotson conducts resampling and sensitivity analyses to ensure the stability of the asset allocation recommendations under a variety of market scenarios.

### 3. Analyze investment options

Ibbotson analyzes the investment options to determine their true investment style through a combination of quantitative and qualitative analyses. First, a returns-based style analysis is conducted, which helps determine an investment option's style over time. Based on the option's personal investment style, Ibbotson creates a customized options style-specific benchmark. Ibbotson uses this style-specific benchmark to examine other quantitative factors such as alpha and tracking error.

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Alpha is a measure of excess return provided by the investment manager and tracking error is a measure of the variability of the alpha. Ibbotson also reviews an investment option's qualitative factors which generally include manager tenure, investment process, style consistency, and regulatory actions, as well as other factors.

## 4. Construct portfolio

Once the asset class models are determined and the investment options are analyzed, Ibbotson determines the appropriate combination of the investment options. This finely tuned approach, which includes alpha-tracking error optimization, incorporates a balanced core group of managers combined with select active managers to create a portfolio that is truly unique and goal specific. Ibbotson uses the customized style-specific benchmark when allocating investment options to finalize the strategic asset class models. By using alpha, tracking error, and investment styles, an optimal mix of investment options is determined and the target strategic asset allocations are implemented.

## 5. Monitor the portfolio

Ibbotson monitors and reviews each portfolio to ensure that it stays in line with its stated strategic asset allocation target. There are many reasons why a strategic asset allocation or fund-specific portfolio may need to be changed over time. Varying market conditions, manager changes, and fund style drift are just a few of the factors that can cause a portfolio to shift from its stated objectives. For these reasons, Ibbotson conducts a periodic rebalance and an annual review of the strategic asset allocation policy.

This proprietary 5-step methodology is consistently applied by Ibbotson to all projects. Through this standardized approach, Ibbotson creates a solid foundation from which innovative solutions are then developed and tailored to each client's needs.

## About Ibbotson

Ibbotson Associates is a leading independent asset allocation provider offering investment advisory services, retirement advice programs, and customized research. Ibbotson applies academic research to create real-world solutions for financial institutions. Our clients include many of the top brokerage firms, insurance companies, banks, asset managers, and retirement plan providers. Ibbotson was founded in 1977 and is a Morningstar company. 

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