
Morningstar use NAG Library routines to assist portfolio construction and optimization

[Ibbotson Associates](#) is a registered investment advisor and wholly owned subsidiary of [Morningstar](#), Inc. Ibbotson Associates was founded in 1977 by Professor Roger Ibbotson. Rooted in academic research, Ibbotson's core investment process approaches portfolio construction from the top-down, starting at the asset allocation level. Ibbotson provides asset allocation, manager selection and portfolio construction services to financial institutions.

These services can be used together to create a comprehensive investment solution or separately to enhance an existing program. Since the company's inception, Ibbotson Associates has worked with many financial institutions providing investment advisory consulting services. Ibbotson currently has approximately 100 client engagements across its investment consulting, fund-of-funds, managed accounts, and plan sponsor consulting business lines.

Rooted in the seminal academic research of Roger Ibbotson, Ibbotson Associates is an industry leader at providing asset allocation services to investment companies and insurance companies. To maintain this leadership, they continuously improve their capabilities in hopes that they will better serve their investors. As a research-driven business operating in a dynamic, highly competitive field, Ibbotson's commitment to ongoing research helps ensure that their core competencies as the thought leader in capital market expectations, asset allocation, asset allocation implementation, individual investor advice, combining traditional investments with insurance solutions, and the conversion of theory into practice is maintained.

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Bo Yuan, Chief Technology Officer
Ibbotson Associates

The Challenge

The Ibbotson Associates proprietary investment methodology creates custom target maturity portfolios for financial institutions serving plans of all sizes in defined contribution markets. The stock-bond mix over time, or glidepath, is set with the optimization techniques to match the unique characteristics of each particular plan's participants. Factors considered in selecting a glidepath include the existence of a defined benefit plan, employee tenure, employee risk capacity, savings rates, median salaries, and others.

The Solution

Knowing that [NAG develops world-class numerical routines for optimization](#), Morningstar called upon them to provide the [NAG Library](#). The [optimization techniques in the NAG Library](#) are utilised by Morningstar on a daily basis, in their portfolio construction products. When observing and analysing portfolios, a quadratic objective function is used to optimize risk and return. The objective function, together with business constraints and other fund analysis is then used by the [NAG optimization functions](#) to do the complex mathematics. Different tracking error weights and forward looking alphas are then run through the model to arrive at a frontier giving the selection of the optimal solutions which are then packaged for clients.

Morningstar has various teams of programmers who write applications in C++, MATLAB and other languages for performance and ease. ***“We have found that the NAG Library is very reliable and is easy to work with, through its extensive documentation and very knowledgeable support team.”*** said Bo Yuan, Chief Technology Officer of Ibbotson Associates, ***“NAG offers us powerful optimization techniques and broad environment support. NAG also enables the use of both serial and parallel processor based numerical computation.”***

Ibbotson Associates also make use of NAG's expert [Support Service](#), which enables them to have contact with the Technical Team that develops the [NAG Library](#). NAG experts are able to advise on the best NAG solution for Ibbotson's complex optimization issues. With NAG's software and support Ibbotson are able to maximise their portfolio construction and optimization.