Portfolio and Risk Management:
Asset Allocation and Risk Budgeting Optimization

S. Nagorny [a]   and D. Widijanto [b]

[a]) ABP Investment, Schiphol, The Netherlands.
[b]) BNG Capital Management, The Hague, The Netherlands.

Abstract

Standard static mean-variance approach assumes that portfolio may be represented by one allocation vector optimized in terms of expected returns & variance-covariance (VcV) matrix. Such one-dimensional approach is not suitable for fixed income: i) portfolio cannot be described by allocation vector only, and ii) return-based VcV-matrix is period dependent. A multi-dimensional optimization is formulated in terms of risk-sensitivity matrix (RSM), allocation and yield vectors. Yield vector reflects term-structure, security and asset selection. Return-based VcV-matrix is expressed in terms of yield VcV-matrix and RSM, which is fully specified by risk budgeting & duration management. An optimal allocation being dependent on RSM is conditional on risk & portfolio management strategy. An instantly efficient portfolio derived from the static one-dimensional approach will not be efficient after an infinitesimal time transformation, since RSM is not time-invariant. Multi-dimensional approach i) allows to find an optimal mix of fixed income asset classes with any desirable properties, ii) guarantees consistency of optimal asset allocation with risk management strategy, iii) provides space for both relative & absolute risk statistics optimization, and iv) allows to incorporate subjective views within the quantitative framework of portfolio construction & optimization. An optimal RSM allows, in principle, for a minimum tracking error portfolio to be more efficient than the benchmark global efficient frontier. Infinite amount of optimal portfolio alteration decisions, subject to risk allocation, is benchmark dependent. Integrated portfolio & risk management process is an essential issue for asset management.