

Index Tracking Portfolio Construction with Sector Weight and Turnover Constraints

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This study examines the index tracking problem using constrained optimization with sector weight and turnover constraints. We implement a mixed-integer quadratic programming model using the Gurobi framework. Our goal is to construct concentrated portfolios that replicate S&P 100 performance. The approach employs a rolling window methodology with in-sample optimization and out-of-sample validation periods to assess performance across varying market conditions. The analysis evaluates constraint combination effects on tracking accuracy, portfolio stability, and computational requirements for 10 and 20-stock portfolios. Results demonstrate that constraints significantly improve index alignment and portfolio stability, while the combination of constraints and warm-start procedures enables substantial computational efficiency gains through solution space reduction.