

# R/Finance 2014: Complex Portfolio Optimization with PortfolioAnalytics

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# Overview

# Modern Portfolio Theory

# Portfolio Optimization Objectives

R/Finance  
2014:  
Complex  
Portfolio  
Optimization  
with Portfolio-  
Analytics

Ross Bennett

## Overview

## PortfolioAnalytics Overview

# PortfolioAnalytics Overview

# Support Multiple Solvers

# Random Portfolios

# Comparison of Random Portfolio Methods



# Random Portfolios: Simplex Method

# Workflow

# Example 1 Data Setup

# Distribution of Monthly Returns

# Minimum Variance Portfolio

# Specify Portfolio

# Ledoit-Wolf Shrinkage Estimate

# Backtesting Parameters



# Run Optimization

## Chart Weights Through Time

# Returns

# Performance Summary

## Example 2: Market Neutral Portfolio

# Specify Portfolio: Constraints

# Specify Portfolio: Objectives





# Plot Results

## Example 3: Data Setup

# Data

# Monthly Returns

# Distribution of Monthly Returns

# Minimum Expected Shortfall

## Specify Initial Portfolio

# Add Objectives



# Run Optimization

# Plot in Risk-Return Space

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## Chart Risk Budgets

# Set Rebalancing Parameters and Run Backtest

# Min ES Risk Contributions and Weights Through Time

# Min ES Risk Budget Limit Risk Contributions and Weights Through Time

# Min ES Equal Component Contribution Risk Contributions and Weights Through Time

# Compute Returns and Chart Performance



# Example 4: Maximize CRRA

# Define a function to compute CRRA

# Specify Portfolio

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# Run Optimization

# Chart Results

# Run Backtest and Compute Returns

# Chart Performance

# Acknowledgements



# References