

# RiskPortfolios: Computation of Risk-Based Portfolios in R

David Ardia<sup>1</sup>, Kris Boudt<sup>2</sup>, and Jean-Philippe Gagnon-Fleury<sup>3</sup>

<sup>1</sup> Institute of Financial Analysis - University of Neuchâtel <sup>2</sup> Solvay Business School - Vrije Universiteit Brussel <sup>3</sup> PSP Investments

DOI: [10.21105/joss.00171](https://doi.org/10.21105/joss.00171)

## Software

- [Review](#) ↗
- [Repository](#) ↗
- [Archive](#) ↗

## Licence

Authors of JOSS papers retain copyright and release the work under a Creative Commons Attribution 4.0 International License ([CC-BY](#)).

## Summary

`RiskPortfolios` is an R package (R Core Team (2016)) for constructing risk-based portfolios. It provides a set of functionalities to build mean-variance, minimum variance, inverse-volatility weighted (Leote De Carvalho, Lu, and Moulin (2012)), equal-risk-contribution (Maillard, Roncalli, and Teiletche (2010)), maximum diversification (Choueifaty and Coignard (2008)), and risk-efficient (Amenc et al. (2011)) portfolios. Optimization is achieved with the R packages `quadprog` (Weingessel (2013)) and `nloptr` (Ypma (2014)). Long or gross constraints can be added to the optimizer. As risk-based portfolios are mainly based on covariances, the package also provides a large set of covariance matrix estimators. A simulation study relying on the package is described in Ardia et al. (2016). The latest version of the package is available at [‘https://github.com/ArdiaD/RiskPortfolios’](https://github.com/ArdiaD/RiskPortfolios).

## References

- Amenc, Noel, Felix Goltz, Lionel Martellini, and Patrice Retkowsky. 2011. “Efficient Indexation: An Alternative to Cap-Weighted Indices.” *Journal of Investment Management* 9 (4): 1–23.
- Ardia, David, Guido Bolliger, Kris Boudt, and Jean-Philippe Gagnon-Fleury. 2016. “The Impact of Covariance Misspecification in Risk-Based Portfolios.”
- Choueifaty, Yves, and Yves Coignard. 2008. “Toward Maximum Diversification.” *Journal of Portfolio Management* 35 (1): 40–51. doi:10.3905/JPM.2008.35.1.40.
- Leote De Carvalho, Raul, Xiao Lu, and Pierre Moulin. 2012. “Demystifying Equity Risk-Based Strategies: A Simple Alpha Plus Beta Description.” *Journal of Portfolio Management* 38 (3): 56–70. doi:10.3905/jpm.2012.38.3.056.
- Maillard, Sébastien, Thierry Roncalli, and Jérôme Teiletche. 2010. “The Properties of Equally Weighted Risk Contribution Portfolios.” *Journal of Portfolio Management* 36 (4). Euromoney Institutional Investor: 60–70. doi:10.3905/jpm.2010.36.4.060.
- R Core Team. 2016. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. <http://www.R-project.org/>.
- Weingessel, Andreas. 2013. *Quadprog: Functions to Solve Quadratic Programming Problems*. <https://cran.r-project.org/package=quadprog>.
- Ypma, Jelmer. 2014. *nloptr: R Interface to NLOpt*. <https://cran.r-project.org/package=nloptr>.