

## Risk Reduction in Large Portfolios: Why Imposing the Wrong Constraints Helps

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### ABSTRACT

**Green and Hollifield (1992)** argue that the presence of a dominant factor would result in extreme negative weights in mean-variance efficient portfolios even in the absence of estimation errors. In that case, imposing no-short-sale constraints should hurt, whereas empirical evidence is often to the contrary. We reconcile this apparent contradiction. We explain why constraining portfolio weights to be nonnegative can reduce the risk in estimated optimal portfolios even when the constraints are wrong. Surprisingly, with no-short-sale constraints in place, the sample covariance matrix performs as well as covariance matrix estimates based on factor models, shrinkage estimators, and daily data.

### REFERENCES

Best, Michael J., and Robert R. Grauer, 1991, On the sensitivity of mean-variance-efficient portfolios to changes in asset means: Some analytical and computational results, *Review of Financial Studies* 4, 315–342.

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Black, Fisher, and Robert Litterman, 1992, Global portfolio optimization, *Financial Analysts Journal* 48, 28–43.

[Google Scholar](#)

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---

Cohen, Kalman, Gabriel Hawawini, Steven Maier, Robert Schwartz, and David Whitcome, 1983, Friction in the trading process and the estimation of systematic risk, *Journal of Financial Economics* 12, 263–278.

[Web of Science®](#) | [Google Scholar](#)

---

Connor, Gregory, and Robert A. Korajczyk, 1986, Performance measurement with the arbitrage pricing theory, *Journal of Financial Economics* 15, 373–394.

[Web of Science®](#) | [Google Scholar](#)

---

Connor, Gregory, and Robert A. Korajczyk, 1988, Risk and return in an equilibrium APT: Applications of a new test methodology, *Journal of Financial Economics* 21, 255–289.

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---

Dimson, Elroy, 1979, Risk measurement when shares are subject to infrequent trading, *Journal of Financial Economics* 7, 197–226.

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---

Elton, Edwin J, and Martin J. Gruber, 1993, Estimating the dependence structure of share prices: Implications for portfolio selection, *Journal of Finance* 28, 1203–1232.

[Google Scholar](#)

---

Fama, Eugene, and Kenneth French, 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33, 3–56.

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---

Frost, Peter A., and James E. Savarino, 1986, An empirical Bayes approach to efficient portfolio selection, *Journal of Financial and Quantitative Analysis* 21, 293–305.

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Green, Richard C., and Burton Hollifield, 1992, When will mean-variance efficient portfolios be well diversified? *Journal of Finance* 47, 1785–1809.

[Web of Science®](#) | [Google Scholar](#)

Jagannathan, Ravi, and Tongshu Ma, 2002, Risk reduction in large portfolios: Why imposing the wrong constraints helps, NBER working paper 8922.

[Google Scholar](#)

Jobson, J. D., and Bob Korkie, 1980, Estimation for Markowitz efficient portfolios, *Journal of the American Statistical Association* 75, 544–554.

[Web of Science®](#) | [Google Scholar](#)

Jobson, J. D., and Bob Korkie, 1981, Putting Markowitz theory to work, *Journal of Portfolio Management* 7, 70–74.

[Google Scholar](#)

Jorion, Philippe, 1985, International portfolio diversification with estimation risk, *Journal of Business* 58, 259–278.

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Jorion, Philippe, 1986, Bayes–Stein estimation for portfolio analysis, *Journal of Financial and Quantitative Analysis* 21, 279–292.

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Jorion, Philippe, 1991, Bayesian and CAPM estimators of the means: Implications for portfolio selection, *Journal of Banking and Finance* 15, 717–727.

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---

Liu, Ludan, 2001, *Portfolio constraints and shrinkage estimation*, Working paper, Carroll School of Management, Boston College.

[Google Scholar](#) 

---

Markowitz, H. M., 1952, Portfolio selection, *Journal of Finance* 7, 77-91.

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---

Markowitz, H. M., 1959, *Portfolio Selection: Efficient Diversification of Investments* (Yale University Press, New Haven, CT).

[Google Scholar](#) 

---

Michaud, Richard O., 1989, The Markowitz optimization enigma: Is “optimized” optimal? *Financial Analysts Journal*, 45, 31-42.

[Google Scholar](#) 

---

Morrison, Donald F., 1990, *Multivariate Statistical Methods* (McGraw-Hill, New York).

[Google Scholar](#) 

---


Newy, Whitney K., and Kenneth D. West, 1987, A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix, *Econometrica* 55, 703-708.

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---

Pastor, Lubos, and Robert Stambaugh, 2000, Comparing asset pricing models: An investments perspective, *Journal of Financial Economics* 56, 335-381.

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---

Shanken, Jay, 1987, Nonsynchronous data and the covariance-factor structure of returns, *Journal of Finance* 42, 221-231.

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[Google Scholar](#) 

---

Sharpe, William, 1963, A simplified model for portfolio analysis, *Management Science* 9, 277-293.

[Web of Science®](#) 

[Google Scholar](#) 

---

Wang, Zhenyu, 2002, *A shrinkage approach to model uncertainty and asset allocation*, Working paper, Columbia University.

[Google Scholar](#) 

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