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# Optimal diversification, stochastic dominance, and sampling error

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+ Author & Article Information

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## Purpose

The purpose of this paper is to contribute to the literature in three ways: first, the authors investigate the impact of the sampling errors on optimal portfolio weights and on financial investment decision. Second, the authors advance a comparative analysis between various domestic and international diversification strategies to define a stochastic optimal choice. Third, the authors propose a new methodology combining the re-sampling method, stochastic optimization algorithm, and nonparametric stochastic dominance (SD) approach to analyze a stochastic optimal portfolio choice for risk-averse American investors who care about benefits of domestic diversification relative to international diversification. The authors propose a new portfolio optimization model involving SD constraints on the portfolio return rate. The authors define a portfolio with return dominating the benchmark portfolio return in the second-order stochastic dominance (SSD) and having maximum expected return. The authors combine re-sampling procedure and stochastic optimization to establish more flexibility in the investment decision rule.

## Design/methodology/approach

The authors apply the re-sampling procedure to consider the sampling error in the optimization process. The authors try to resolve the problem of the stochastic optimal investment strategy choice using the nonparametric SD test by Linton *et al.* (2005) based on sub-sampling simulated *p* values. The authors apply the stochastic portfolio optimization algorithm with SSD constraints to define optimal diversified portfolios beating benchmark indices.

## Findings

First, the authors find that reducing sampling error increases the dominance relationships between different portfolios, which, in turn, alters portfolio investment decisions. Though international diversification is preferred in some cases, the study's results show that after the 2007-2008 financial crisis. Nevertheless, the authors find that stochastic diversification in domestic, global, and Europe, Australasia, and Far East markets delivers better risk returns for the US risk averters during the crisis period.

## Originality/value

The originality of the idea in this paper is to introduce a new methodology combining the concept of portfolio re-sampling, stochastic portfolio optimization with SSD constraints, and the nonparametric SD test by Linton *et al.* (2005) based on subsampling simulated *p* values to analyze the impact of sampling errors on optimal portfolio returns and to investigate the problem of stochastic optimal choice between international and domestic diversification strategies. The authors try to prove more coherence in the portfolio choice with the stochastically and the uncertainty characters of the paper.

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**Keywords:** International diversification, Stochastic dominance, Portfolio re-sampling, Stochastic optimization, Sub-sampling simulation