

**Emelichev, Vladimir; Nikulin, Yury; Korotkov, Vladimir**

**Stability analysis of efficient portfolios in a discrete variant of multicriteria investment problem with Savage's risk criteria.** (English) [Zbl 1390.91281](#)  
*Comput. Sci. J. Mold.* 25, No. 3, 303-328 (2017).

Summary: We consider a multicriteria discrete variant of investment portfolio optimization problem with Savage's risk criteria. Three combinations of norms in problem parameter spaces are considered. In each combination, one of the three spaces is endowed with Hölder's norm, and the other two spaces are endowed with Chebyshev's norm. The lower and upper attainable bounds on the stability radius of one Pareto optimal portfolio are obtained.

**MSC:**

91G10 Portfolio theory

**Keywords:**

multicriteria problem; Pareto-optimal portfolio; Savage's risk criteria; stability radius; Hölder's norms

**Full Text:** [Link](#)

**References:**

- [1] Sironi, P., *Modern portfolio management: From Markowitz to probabilistic scenario optimisation*, 222 p. pp., (2015), Risk books: Risk books, London
- [2] Fabozzi, F.; Markowitz, H., *The theory and practice of investment management: Asset allocation, valuation, portfolio construction, and strategies*, 704 p. pp., (2011), Wiley: Wiley, New Jersey
- [3] Markowitz, H., *Portfolio selection: efficient diversification of investments*, 402 p. pp., (1991), Wiley: Wiley, New York
- [4] Hirschberger, M.; Steuer, R.; Utz, S.; Wimmer, M.; Qi, Y., Computing the nondominated surface in tri-criterion portfolio selection, *Operations Research*, 61, 1, 169-183, (2013) · [Zbl 1267.90132](#)
- [5] Crouhy, M.; Galai, D.; Mark, R., *The essentials of risk management*, 261. p. pp., (2014), McGraw-Hill Education: McGraw-Hill Education, New York
- [6] Chakravarti, N.; Wagelmans, A., Calculation of stability radii for combinatorial optimization problem, *Operations Research Letters*, 23, 1-2, 1-7, (1998) · [Zbl 0954.90037](#)
- [7] Emelichev, V.; Podkopaev, D., Quantitative stability analysis for vector problems of 0-1 programming, *Discrete Optimization*, 7, 1-2, 48-63, (2010) · [Zbl 1293.90070](#)
- [8] Van Hoesel, S.; Wagelmans, A., On the complexity of postoptimality analysis of 0-1 programs, *Discrete Applied Mathematics*, 91, 1-3, 251-263, (1999) · [Zbl 0917.90250](#)
- [9] Kozeratska, L.; Forbes, J.; Goebel, R.; Kresta, J., Perturbed cones for analysis of uncertain multi-criteria optimization problems, *Linear Algebra and its Applications*, 378, 203-229, (2004) · [Zbl 1079.90134](#)
- [10] Emelichev, V.; Kotov, V.; Kuzmin, K.; Lebedeva, T.; Semenova, N.; Sergienko, T., Stability and effective algorithms for solving multiobjective discrete optimization problems with incomplete information, *Journal Automation and Information Sciences*, 26, 2, 27-41, (2014)
- [11] Sotskov, Y.-N.; Sotskova, N.-Y.; Lai, T.; Werner, F., *Scheduling under uncertainty. Theory and algorithms*, 326 p. pp., (2010), Belorusskaya nauka: Belorusskaya nauka, Minsk
- [12] Sotskov, Y.; Lai, T., Minimizing total weighted flow under uncertainty using dominance and a stability box, *Computers & Operations Research*, 39, 6, 1271-1289, (2012) · [Zbl 1251.90190](#)
- [13] Sotskov, Y.-N.; Werner, F.; Sotskov, Y.-N.; Werner, F., *Sequencing and Scheduling with Inaccurate Data*, 12, 283-343, (2014), New York: Nova Science Publishers, New York
- [14] Soberanis, P., *Risk Optimization with p-order Conic Constraints*, 122 p. pp., (2009)
- [15] Lebedeva, T.; Sergienko, T., Т.Т. Лебедева, Т.И. Сергиенко. Разные типы устойчивости векторной задачи целочисленной оптимизации: общий подход // *Кибернетика и системный анализ*. — 2008. — № 3. — С. 142-148. Different types of stability of vector integer optimization problem: general approach, *Cybernetics and Systems Analysis*, 44, 3, 429-433, (2008)
- [16] Lebedeva, T.; Semenova, N.; Sergienko, T., Т.Т. Лебедева, Н.В. Семенова, Т.И. Сергиенко. Устойчивость векторных задач целочисленной оптимизации: взаимосвязь с устойчивостью множеств оптимальных и неоптимальных решений // *Кибернетика и системный анализ*. — 2005. — № 4. — С. 89-100. Stability of vector problems of integer optimization:

- relationship with the stability of sets of optimal and nonoptimal solutions, *Cybernetics and Systems Analysis*, 41, 4, 551-558, (2005)
- [17] Emelichev, K.; Kuzmin, K., В.А. Емеличев, К.Г. Кузьмин. Критерии устойчивости векторных комбинаторных задач “на узкие места” в терминах бинарных отношений // *Кибернетика и системный анализ*. — 2008. — № 3. — С. 103-111. Stability criteria in vector combinatorial bottleneck problems in terms of binary relations, *Cybernetics and Systems Analysis*, 44, 3, 397-404, (2008)
- [18] Emelichev, V.; Karelkina, O., Postoptimal analysis of the multicriteria combinatorial median location problem, *Optimization*, 61, 9, 1151-1167, (2012) · [Zbl 1252.90070](#)
- [19] Emelichev, V.; Korotkov, V.; Nikulin, Y., Post-optimal analysis for Markowitz’s multicriteria portfolio optimization problem, *Journal of Multi-Criteria Decision Analysis*, 21, 1-2, 95-100, (2014)
- [20] Emelichev, V.; Korotkov, V.; Kuzmin, K., Multicriterial investment problem in conditions of uncertainty and risk, *Journal of Computers and Systems Sciences International*, 50, 6, 1011-1018, (2011) · [Zbl 1276.91092](#)
- [21] Emelichev, V.; Korotkov, V.; Kuzmin, K., On stability of a Pareto-optimal solution of a portfolio optimization problem with Savage’s minimax risk criteria, *Buletinul Academiei de Stiinte a Republicii Moldova. Matematica*, 64, 3, 35-44, (2010) · [Zbl 1242.90105](#)
- [22] Emelichev, V.; Korotkov, V., В.А. Емеличев, В.В. Коротков. О радиусе устойчивости векторной инвестиционной задачи с критериями минимаксного риска Сэвиджа // *Кибернетика и системный анализ*. — 2012. — № 3. — С. 68-77.. Stability radius of a vector investment problem with Savage’s minimax risk criteria, *Cybernetics and Systems Analysis*, 48, 3, 378-386, (2012)
- [23] Emelichev, V.; Korotkov, V., Stability analysis of Pareto optimal portfolio of multicriteria investment maximin problem in the Holder metric, *Buletinul Academiei de Stiinte a Republicii Moldova. Matematica*, 70, 3, 63-71, (2012) · [Zbl 1305.90301](#)
- [24] Bukhtoyarov, S.; Emelichev, V., On the stability measure of solutions to a vector version of an investment problem, *Journal of Applied and Industrial Mathematics*, 9, 3, 328-334, (2015) · [Zbl 1349.90728](#)
- [25] Bronshtein, E.; Kachkaeva, M.; Tulupova, E., Control of investment portfolio based on complex quantile risk measures, *Journal of Computers and Systems Sciences International*, 50, 1, 174-180, (2011) · [Zbl 1270.91083](#)
- [26] Yu, P., *Multiple-criteria decision making: concepts, techniques, and extensions*, 404. p. pp., (1985), Plenum Press: Plenum Press, New York
- [27] Savage, L., *The Foundations of statistics*, 310. p. pp., (1972), Dover: Dover, New York
- [28] Du, D.; Pardalos, P., *Minimax and applications*, 296. p. pp., (1995), Kluwer: Kluwer, Dordrecht
- [29] Emelichev, V.; Kuzmin, K., A general approach to studying the stability of a Pareto optimal solution of a vector integer linear programming problem, *Discrete Mathematics and Applications*, 17, 4, 349-354, (2007) · [Zbl 1278.90268](#)
- [30] Emelichev, V.; Kuzmin, K.; Nikulin, Y., Stability analysis of the Pareto optimal solution for some vector Boolean optimization problem, *Optimization*, 54, 6, 545-561, (2005) · [Zbl 1147.90378](#)
- [31] Miettinen, K., *Nonlinear multiobjective optimization*, 298. p. pp., (1999), Kluwer: Kluwer, Boston
- [32] Libura, M., On accuracy of solution for combinatorial optimization problems with perturbed coefficients of the objective function, *Annals of Operations Research*, 86, 9, 53-62, (1999) · [Zbl 0918.90121](#)
- [33] Libura, M., Quality of solutions for perturbed combinatorial optimization problems, *Control and Cybernetics*, 29, 1, 199-219, (2000) · [Zbl 1030.90108](#)
- [34] Libura, M.; Nikulin, Y., Stability and accuracy functions in multicriteria linear combinatorial optimization problems, *Annals of Operations Research*, 147, 1, 255-267, (2006) · [Zbl 1187.90256](#)
- [35] Makela, M.; Nikulin, Y., Stability and accuracy functions for a multicriteria Boolean linear programming problem with parameterized principle of optimality from Condorcet to Pareto, *European Journal of Operational Research*, 207, 3, 1497-1505, (2010) · [Zbl 1206.90095](#)
- [36] Nikulin, Y., Stability and accuracy functions for a coalition game with linear payoffs, antagonistic strategies and bans, *Annals of Operations Research*, 172, 1, 25-35, (2009) · [Zbl 1183.91015](#)
- [37] Nikulin, Y.; Sotskov, Y.,-N.; Werner, F., *Sequencing and Scheduling with Inaccurate Data*, 15, (2014), Nova Science Publishers: New York, Nova Science Publishers
- [38] Libura, M., On the robustness of optimal solutions for combinatorial optimization problems, *Control and Cybernetics*, 38, 3, 671-685, (2009) · [Zbl 1301.49061](#)
- [39] Libura, M., A note on robustness tolerances for combinatorial optimization problems, *Information Processing Letters*, 110, 16, 725-729, (2010) · [Zbl 1234.90016](#)
- [40] Kouvelis, P.; Yu, G., *Robust discrete optimization and its applications*, 358 p. pp., (1997), Kluwer: Kluwer, Norwell · [Zbl 0873.90071](#)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.