A COMPLETE CONVERGENCE THEOREM FOR WEIGHTED SUMS UNDER THE SUB–LINEAR EXPECTATIONS

FENGXIANG FENG* AND HAIWU HUANG

Abstract. In this article, we study a complete convergence theorem for weighted sums in sub-linear expectations space. We establish a complete convergence theorem for weighted sums under the optimal moment conditions in sub-linear expectations space. Our result extends and improves the corresponding result of Cai (Metrika, 68:323-331, 2008) in some extent.

REFERENCES

[1] L. DENIS, C. MARTINI, *A theoretical framework for the pricing of contingent claims in the presence of model uncertainty*, Ann. Appl. Probab. 2006, 16 (2), 827–852.
[2] I. GILBOA, *Expected utility theory with purely subjective non-additive probabilities*, J. Math. Econom. 1987, 16, 65–68.
[3] M. MARINACCI, *Limit laws for non-additive probabilities and their frequentist interpretation*, J. Econom. Theory. 1999, 84, 145–195.
[4] S. PENG, *BSDE and related g-expectation*, Pitman. Res. Notes. Math. Ser. 1997, 364, 141–159.
[5] S. PENG, *Monotonic limit theorem of BSDE and nonlinear decomposition theorem of Doob-Meyer type*, Probab. Theory Related Fields 1999, 113, 473–499.
[6] S. PENG, *G-expectation, G-Brownian motion and related stochastic calculus of Ito type*, In: Proceedings of the 2005 Abel Symposium, Berlin-Heidelberg: Springer, 2006, 541–567.
[7] S. PENG, *Multi-dimensional G-Brownian motion and related stochastic calculus under G-expectation*, Stochastic Process Appl. 2008, 118 (12), 2223–2253.
[8] S. PENG, *A new central limit theorem under sublinear expectations*, 2008, ArXiv:0803.2656v1 [math.PR].
[9] S. PENG, *Nonlinear Expectations and Stochastic Calculus under Uncertainty*, 2010, ArXiv:1002.4546 [math.PR].
[10] S. PENG, *Law of large numbers and central limit theorem under nonlinear expectations*, 2007, ArXiv:math.PR/0702358vl [math.PR].
[11] Z. J. CHEN, *Strong laws of large numbers for sub-linear expectations*, Sci. China Math. 2016, 59 (5), 945–954.
[12] C. HU, *A strong law of large numbers for sub-linear expectation under a general moment condition*, Statist. Probab. Lett. 2016, 119, 248–258.
[13] Y. Q. CHEN, A. Y. CHEN, W. N. G. KAI, *The strong law of large numbers for extended negatively dependent random variables*, J. Appl. Prob. 2010, 47, 908–922.
[14] Q. Y. WU, Y. Y. JIANG, *Strong law of large numbes and Chover's law of the iterated logarithm under sub-linear expectations*, J. Math. Anal. Appl. 2018, 460, 252–270.
[15] X. F. TANG, X. J. WANG, Y. WU, *Exponential inequalities under sub-linear expectations with applications to strong law of large numbers*, Filomat, 2019, 33 (10), 2951–2961.
[16] Z. J. CHEN, F. HU, *A law of the iterated logarithm for sublinear expectations*, J. Financ Eng. 2014, 1, 1–15.
[17] L. X. ZHANG, *Exponential inequalities under sub-linear expectations with applications to laws of the iterated logarithm*, Sci. China Math. 2016, 59 (12), 2503–2526.

[18] L. X. Zhang, *Donsker's invariance principle under the sub-linear expectation with an application to Chung's law of the iterated logarithm*, Communications in Math. Stat. 2015, 3, 187–214.

[19] L. X. Zhang, *Rosenthal's inequalities for independent and negatively dependent random variables under sub-linear expectations with applications*, Sci. China Math. 2016, 59 (4), 751–768.

[20] F. X. Feng, D. C. Wang, Q. Y. Wu, *Complete convergence for weighted sums of negatively dependent random variables under the sub-linear expectations*, Communications in Statistics-Theory and Methods 2019, 48 (6), 1351–1366.

[21] H. Y. Zhong, Q. Y. Wu, *Complete convergence and complete moment convergence for weighted sums of extended negatively dependent random variables under sub-linear expectation*, J. Inequal. Appl. 261 (2017), doi:10.1186/s13660-017-1538-1.

[22] M. M. Xi, Y. Wu, X. J. Wang, *Complete convergence for arrays of rowwise END random variables and its statistical applications under sub-linear expectations*, Journal of the Korean Statistical Society, 2019, 48 (3), 412–425.

[23] L. X. Zhang, *Self-normalized moderate deviation and laws of the iterated logarithm under G-expectation*, Commun. Math. Stat. 2016, 4, 229–263.

[24] Y. Wu, X. J. Wang, L. X. Zhang, *On the asymptotic approximation of inverse moment under sub-linear expectations*, Journal of Mathematical Analysis and Applications, 2018, 468 (1), 182–196.

[25] L. Baum, M. Katz, *Convergence rates in the law of large numbers*, Trans. Amer. Math. Soc., 1965, 120 (1), 108–123.

[26] M. Peligrad, A. Gut, *Almost sure results for a class of dependent random variables*, J. Theoret. Probab. 1999, 12, 87–104.

[27] X. J. Wang, X. Deng, L. L. Zheng, S. H. Hu, *Complete convergence for arrays of rowwise negatively superadditive dependent random variables and its applications*, Statistics: A Journal of Theoretical and Applied Statistics, 2014, 48 (4), 834–850.

[28] Q. Y. Wu, *Complete convergence for negatively dependent sequences of random variables*, Journal of Inequalities and Applications, vol. 2010, Article ID 507293, 10 pages.

[29] H. W. Huang, D. C. Wang, Q. Y. Wu, Q. X. Zhang, *A note on the complete convergence for sequences of pairwise NQD random variables*, J. Inequal. Appl. 2011, 92 doi:10.1186/1029-242X-2011-92.

[30] P. Y. Chen, S. H. Sung, *Complete convergence and strong laws of large numbers for weighted sums of negatively orthant dependent random variables*, Acta Math. Hungar. 2016, 148 (1): 83–95.

[31] X. J. Wang, A. T. Shen, Z. Y. Chen, S. H. Hu, *Complete convergence for weighted sums of NSD random variables and its application in the EV regression model*, TEST, 2015, 24 (1): 166–184.

[32] L. X. Zhang, *Strong limit theorems for extended independent and extended negatively dependent random variables under non-linear expectations*, 2016, arXiv preprint arXiv:1608.00710.

[33] S. H. Sung, *On the strong convergence for weighted sums of random variables*, Stat Papers. 2011, 52, 447–454.

[34] G. H. Cai, *Strong laws for weighted sums of NA random variables*, Metrika. 2008, 68, 323–331.

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