

When Does a Randomly Weighted Self-normalized Sum Converge in Distribution?

David M. Mason, *University of Delaware, USA*
Joel Zinn, *Texas A&M University, USA*

Abstract

We determine exactly when a certain randomly weighted, self-normalized sum converges in distribution, partially verifying a 1965 conjecture of Leo Breiman. We, then, apply our results to characterize the asymptotic distribution of relative sums and to provide a short proof of a 1973 conjecture of Logan, Mallows, Rice and Shepp on the asymptotic distribution of self-normalized sums in the case of symmetry.

Full text: [PDF](#) | [PostScript](#)

Pages: 70-81

Published on: April 16, 2005

Research Support Tool

[Capture Cite](#)
[View Metadata](#)
[Printer Friendly](#)

▼ [Context](#)

[Author Address](#)

▼ [Action](#)

[Email Author](#)
[Email Others](#)

Bibliography

- N.H. Bingham, and J.L. Teugels. Conditions implying domains of attraction. *Proceedings of the Sixth Conference on Probability Theory* (Bracsov, 1979), (1981) pp. 23--34, Ed. Acad. R. S. Romania, Bucharest. [Math. Review 0633913](#)
1. N.H. Bingham, C. M. Goldie and J. L. Teugels. Regular Variation. *Encyclopedia of Mathematics and its Applications*, (1987) 27, Cambridge University Press, Cambridge. [Math. Review 0898871](#)
 2. L. Breiman, On some limit theorems similar to the arc-sin law. *Teor. Veroyatnost. i Primenen* (1965) 10, pp. 351--360. [Math. Review 0184274](#)
 3. G. P. Chistyakov and F. Götze Limit distributions of studentized sums. *Ann. Probab.*, (2004) 32, 28--77. [Math. Review 2040775](#)
 4. D. A. Darling. The influence of the maximum term in the addition of independent random variables. *Trans. Amer. Math. Soc.* (1952) 73, 95-107. [Math. Review 0048726](#)
 5. A. Devinatz. On a theorem of Lévy-Raikov. *Ann. Math. Statist* (1959) 30, 583--586. [Math. Review 0102851](#)
 6. E. Giné, F. Götze and D. M. Mason. When is the Student t -statistic asymptotically standard normal? *Ann. Probab.* (1997) 25 1514--1531. [Math. Review 1457629](#)
 7. P. S. Griffin and D. M. Mason. On the asymptotic normality of self-normalized sums. *Proc. Cambridge Phil. Soc.* (1991) 109 597-610. [Math. Review 1094756](#)
 8. E. Haeusler and D. M. Mason. On the asymptotic behavior of sums of order statistics from a distribution with a slowly varying upper tail. In: *Sums, Trimmed Sums and Extremes*. (M. G. Hahn, D. M. Mason and D. C. Weiner, ed.) (1991) pp. 355--376. Birkhäuser, Boston. [Math. Review 1117277](#)
 9. I. A. Ibragimov and Yu. V. Linnik. *Independent and Stationary Sequences of Random Variables*. With a Supplementary Chapter by I. A. Ibragimov and V. V. Petrov. Translation from the Russian edited by J. F. C. Kingman (1971) Wolters-Noordhoff Publishing, Groningen. [Math. Review 0322926](#)
 10. R. LePage, M. Woodroffe and J. Zinn. Convergence to a stable distribution via order statistics. *Ann. Probab* (1981) 9 713--752. [Math. Review 0624688](#)
 11. G. D. Lin. On the moment problems. *Statist. Probab. Lett.* (1997) 35 85--90. [Math. Review 1467713](#)
 12. B. F. Logan, C. L. Mallows, S. O. Rice and L. Shepp. Limit distributions of self-normalized sums. *Ann. Probab.* (1973) 1 788--809. [Math. Review 0362449](#)
 13. B. Ramachandran and K. Lau. *Functional Equations in Probability Theory*. Academic Press, Inc., Boston, MA (1991). [Math. Review 1132671](#)

14. V. M. Zolotarev. *One-dimensional Stable Distributions*. Translated from the Russian by H. H. McFaden. Translation edited by Ben Silver. Translations of Mathematical Monographs, 65. American Mathematical Society, Providence, RI. (1986). [Math. Review 0854867](#)



[Home](#) | [Contents](#) | [Submissions, editors, etc.](#) | [Login](#) | [Search](#) | [EJP](#)

[Electronic Communications in Probability](#). ISSN: 1083-589X