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On the range of self-normalized Cramer type moderate deviations.

We study the self-normalized Cramer type moderate deviations for centered independent random variables with finite third or higher moments and obtain the exact self-normalized tail probabilities for all $x = o(n^{1/2})$. This is an extension of the results in Jing, Shao and Wang (2003) where at most finite third moment is assumed. In particular, if the centered independent random variables have zero third moment, the Cramer type moderate deviations hold uniformly for x in a range which is related to the moments with order between 3 and 4. Further it is proved that the range $[0, o(n^{1/4})]$ is optimal under some regular moment conditions. We also show the necessity of the zero third moment condition in Cramer type moderate deviations for x outside the range of $[0, o(n^{1/6})]$. (Received July 28, 2014)