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A COMMENT ON STAR-ORDERING AND TAIL-ORDERING

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In a recent letter, Deshpande and Kochar (1983) gave the following theorem.

Theorem. Let F and G be absolutely continuous distribution functions such that $F(0) = G(0) = 0$ and $f(0) \geqq g(0) > 0$ where f and g are corresponding density functions, then if F is star-ordered with respect to G then it is tail-ordered with respect to G.

One does not need to have absolute continuity, the only condition required is

$$\lim_{x \to 0^+} \frac{G^{-1}(F(x))}{x} \geqq 1. \tag{1}$$

Since $F^* < G$, therefore, $G^{-1}(F(x))/x$ is non-decreasing in x and (1) implies $G^{-1}(F(x))/x \geqq 1$ for all $x \geqq 0$ and hence $x((G^{-1}(F(x))/x) - 1)$ is non-decreasing in x for $x \geqq 0$ as it is the product of two non-decreasing non-negative functions. Therefore, $G^{-1}(F(x)) - x$ is non-decreasing in x for $x \geqq 0$, i.e. $F \overset{t}{<} G$.

Reference

Deshpande, J. V. and Kochar, S. C. (1983) Dispersive ordering is the same as tail-ordering. *Adv. Appl. Prob.* **15,** 686–687.

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