

## Letter to the Editor

### THE SYMMETRIC FOOTRULE IS GINI'S RANK ASSOCIATION COEFFICIENT

In “The symmetric footrule,” Salama and Quade (2001) proposed the following symmetric version  $C_n$  of Spearman's footrule: Let  $\{(X_i, Y_i)\}_{i=1}^n$  be a random sample from a continuous bivariate distribution, and let  $(Q_1, \dots, Q_n), (R_1, \dots, R_n)$  be the corresponding vectors of ranks, and set

$$C_n = \frac{1}{M_n} \sum_{i=1}^n [ |Q_i + R_i - (n+1)| - |Q_i - R_i| ],$$

where  $M_n = n^2/2$  if  $n$  is even or  $(n^2 - 1)/2$  if  $n$  is odd. The authors studied the distribution of  $C_n$  under the assumption of independence, provided tables of the exact distribution for  $n = 4(1)13$ , and found the population parameter estimated by  $C_n$ .

The purpose of this letter is to note that  $C_n$  is also known as Gini's rank association coefficient. It was first discussed in 1914 by Corrado Gini (1914), who called it the *indice de cograduazione semplice*. As Betrò (1993) points out, the exact distribution of  $C_n$  was given in Savorgnan (1915) for  $n \leq 5$ , in Salvemini (1951) for  $n = 7$ , and Cifarelli and Regazzini (1977) for  $n = 8, 9, 10$  (who also established the asymptotic normality of  $C_n$ ). Betrò (1993) provides tables for  $n = 8(1)15$ ; while Rizzi (1971) provides approximate values for  $n \leq 30$ . The population parameter

estimated by  $C_n$  appears in various forms in Scarsini (1984) and Schweizer (1991), and is studied extensively in Nelsen (1998).

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