

## ON YOUNG'S INEQUALITY AND ITS REVERSE FOR BOUNDING THE LORENZ CURVE AND GINI MEAN

PIETRO CERONE

**Abstract.** The performance of the Young integral inequality is investigated for bounding the Lorenz curve and the Gini index. The study relies on a comparison of reverse Young type integral inequalities. The resulting approximation and bounds for the Lorenz curve and the Gini index are compared with previous results.

**Mathematics subject classification (2000):** 62H20, 62G10, 62P20, 26D15.

**Keywords and phrases:** Gini mean difference, Gini index, Lorenz curve, variance, coefficient of variation, Young's integral inequality, reverse Young's inequality.

### REFERENCES

- [1] P.S. BULLEN, *The inequality of Young*, Univ. Beograd. Publ. Elektrotehn. Fak. Ser. Mat. Fiz., **357–380** (1971), 51–54.
- [2] P. CERONE, *Bounding the Gini mean difference*, Inequalities and Applications, International Series of Numerical Mathematics, Vol. **157**, C. Bandle, A. Losonczi, Zs. Pales and M. Plum, Eds., 2009, 77–89.
- [3] P. CERONE AND S.S. DRAGOMIR, *A survey on bounds for the Gini Mean Difference*, Advances in Inequalities from Probability Theory and Statistics, N.S. Barnett and S.S. Dragomir (Eds.), Nova Science Publishers, 2008, 81–111.
- [4] P. CERONE AND S.S. DRAGOMIR, *Bounds for the Gini mean difference via the Sonin identity*, Comp. Math. Modelling, **50** (2005), 599–609.
- [5] P. CERONE AND S.S. DRAGOMIR, *Bounds for the Gini mean difference via the Korkine identity*, J. Appl. Math. & Computing (Korea), **22**, 3 (2006), 305–315.
- [6] P. CERONE AND S.S. DRAGOMIR, *Bounds for the Gini mean difference of continuous distributions defined on finite intervals (I)*, Applied Mathematics Letters, **20** (2007), 782–789.
- [7] P. CERONE AND S.S. DRAGOMIR, *Bounds for the Gini mean difference of continuous distributions defined on finite intervals (II)*, Comput. Math. Appl., **52**, 10–11 (2006), 1555–1562.
- [8] H.A. DAVID, *Gini's mean difference rediscovered*, Biometrika, **55** (1968), 573.
- [9] J.B. DIAZ AND F.T. METCALF, *An analytic proof of Young's inequality*, Amer. Math. Monthly, **77** (1970), 603–609.
- [10] J.L. GASTWIRTH, *The estimation of the Lorenz curve and Gini index*, Rev. Econom. Statist., **54** (1972), 305–316.
- [11] C. GINI, *Variabilità e Metabilità, contributo allo studio della distribuzioni e relationi statistiche*, Studi Economico-Gicenitrici dell' Univ. di Coglani, **3** (1912), art. 2, 1–158.
- [12] G.M. GIORGI, *Bibliographic portrait of the Gini concentration ratio*, Metron, **XLVIII**, 1–4 (1990), 103–221.
- [13] G.M. GIORGI, *Alcune considerazioni teoriche su di un vecchio ma per sempre attuale indice: il rapporto di concentrazione del Gini*, Metron, **XLII**, 3–4 (1984), 25–40.
- [14] G.H. HARDY, J.E. LITTLEWOOD AND G. POLYA, *Inequalities*, Cambridge Univ. Press.
- [15] M. KENDALL AND A. STUART, *The Advanced Theory of Statistics*, Volume 1, Distribution Theory, Fourth Edition, Charles Griffin & Comp. Ltd., London, 1977.
- [16] P.R. MERCER, *Extensions of Steffensen's inequality*, J. Math. Anal. & Applics., **246** (2000), 325–329.
- [17] M.J. MERKLE, *A contribution to Young's inequality*, Univ. Beograd. Publ. Elektrotehn. Fak. Ser. Mat. Fiz., **461–697** (1974), 265–267.

- [18] D.S. MITRINović, J.E. PEČARIĆ AND A.M. FINK, *Classical and New Inequalities in Analysis*, Kluwer Academic Publishers, Dordrecht/Boston/London, 1993.
- [19] Z. PÁLES, *A general version of Young's inequality*, Arch. Math., **58** (1992), 360–365.
- [20] A. WITKOWSKI, *On Young's inequality*, J. Ineq. Pure and Appl. Math., **7**, 5 (2007), Art. 164. [ON-LINE <http://jipam.vu.edu.au/article.php?sid=782>].
- [21] W.H. YOUNG, *On classes of summable functions and their Fourier series*, Proc. Roy. Soc. London (A), **87** (1912), 225–229.