

# Calibrated estimation of a nonparametric income distribution from a few percentiles

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## Abstract

For different welfare studies, often an estimate of the income or consumption distribution is needed even if only few percentiles (e.g. quantiles and quintiles) are available. In the past, simulation methods, interpolation or smoothing methods with strong over-smoothing properties were applied to obtain an idea of the entire distribution. A method for estimation of a convex function based on spline smoothing is proposed for estimating the Lorenz curve from sparse data points. Compared to the currently available methods, the new estimate does not require constrained optimization nor simulations. The use of the functional form for the Lorenz curve enables us to provide a nonparametric density or cumulative distribution function that is consistent with the given percentiles. Further, we can easily derive important welfare measures such as the Gini coefficient for inequality. In the simulation study and a real application with quintile share data on US income, it can be seen that our estimation method performs very well.

**Key Words:** Income distribution, Lorenz curve, smoothing splines, nonparametric estimation.

**Subject Category:** A2, E1, D5