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Insurance Ratemaking and a Gini Index

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In 1905, Max Otto Lorenz displayed skewed income distributions using a graph now known as the Lorenz curve. In 1912, Corrado Gini summarized this curve with a statistic now known as the Gini index. Both devices are widely used in welfare economics, among other fields. This paper extends these concepts to a financial context by ordering risks; the ordering variable is a risk based score relative to price, known as a relativity.

Using the relativity ordering, we develop a Lorenz curve and Gini index that can cope with adverse selection and measure potential profit. We provide a detailed example using homeowners insurance. Further, we show that the Gini index can be written in terms of covariance operators, thus expanding the scope of interpretations. We implement theory to calibrate sample sizes, establishing that the number of observations typically encountered in insurance practice is sufficient for reliable estimation.