Measuring Correlation in the Presence of Spikes

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The cost of electricity varies across the zones of the New York State electric system. While fair and open access to the electrical grid is sought, we show that that residents currently do not equally benefit, or suffer, from price changes. Upcoming major investments in the grid offer an opportunity to rectify these inequalities, but only if we understand the price-change propagation dynamics for the current underlying infrastructure. We study these dynamics, estimating the partial correlations between changes in electricity prices in connected zones. We develop and investigate a robust exponentially weighted correlation estimator that performs well in the presence of electricity price spikes and can track a rapidly-changing time-varying correlation. We show that price-change partial correlations are mostly positive, but can also be negative, and provide new insight into price-change dynamics within the grid that cannot be extracted from the price-setting algorithm or obtained from available transmission capability data.